TECHNOLOGY DEPARTMENT

October
1928

Construction Methods

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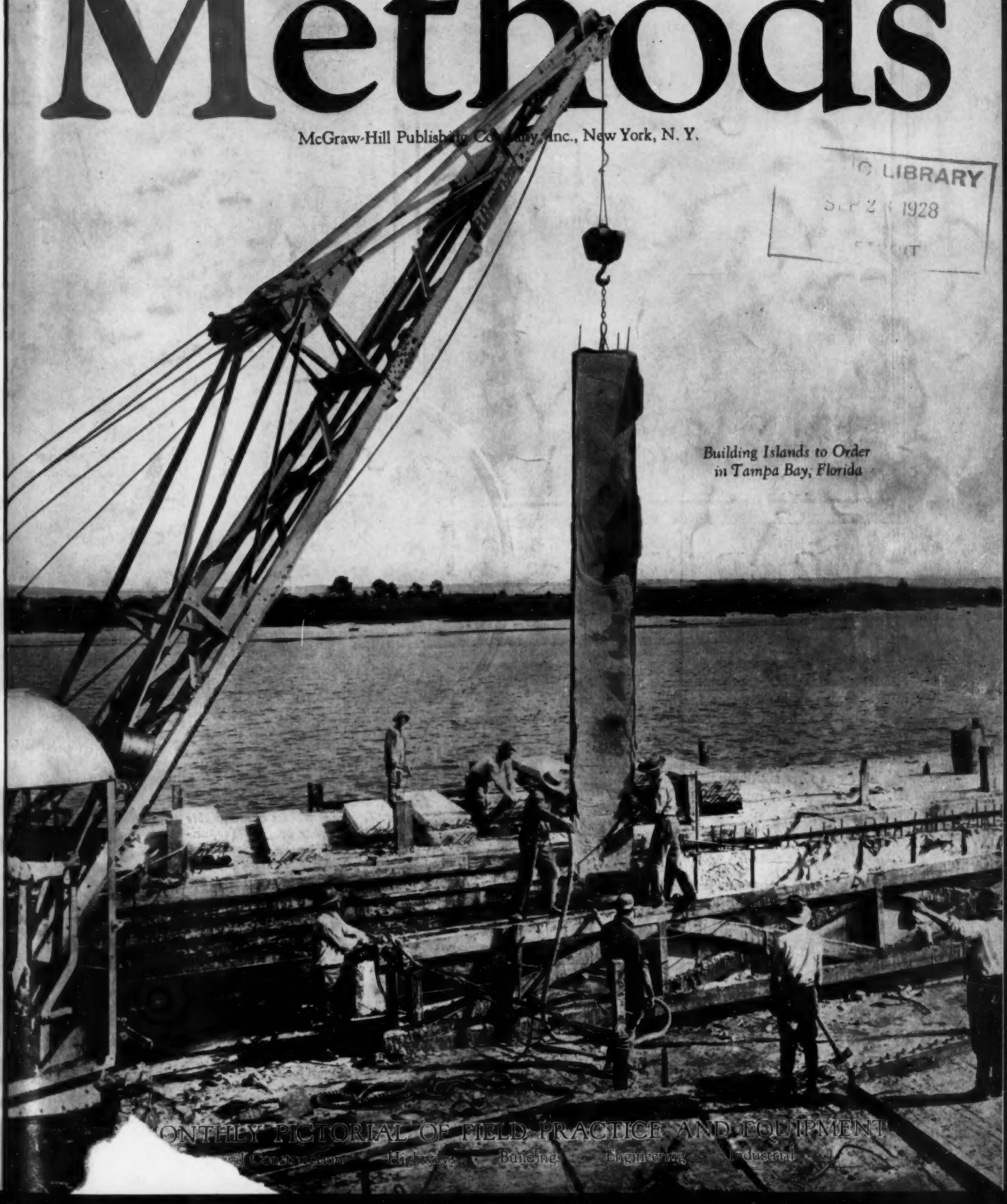

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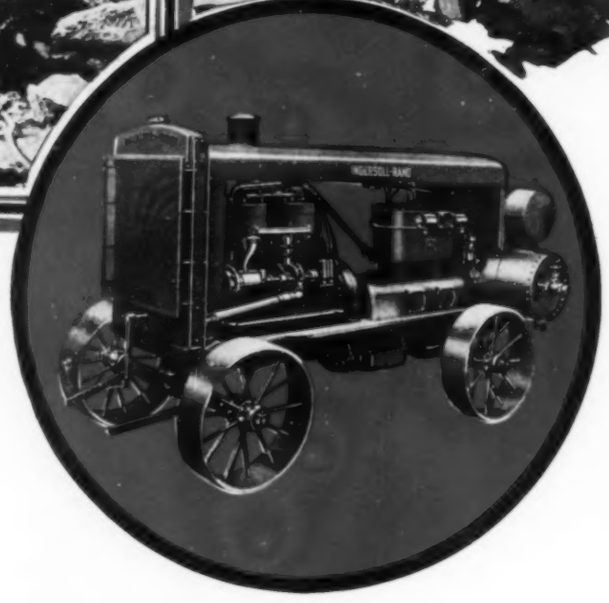

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TECHNOLOGY DEPT.

What's Doing This Month

Looking it over with the Editor

Big Bridge Approach

WE'RE taking you on a trip, this month, to one of the most interesting large-scale construction operations in New York's metropolitan district—the construction of the west approach and anchorage tunnels for the $75,000,000 suspension bridge that will span the Hudson River between New York and New Jersey. Here's a bridge job that is essentially a big quarrying and mining operation. At least, that's the way Foley Bros., Inc., the contractors, are handling it—200,000 yd. of hard rock excavation in open cut and in a pair of huge inclined tunnels. Lots of interesting construction kinks on this job—and pictures of a number of them with the article on pp. 14 to 17 of this issue.

LEGAL RESTRICTIONS—The law, as many contractors have discovered to their grief, often imposes restrictions upon the best-intentioned builders. Superintendents of an organization which recently entered a neighboring state to erect an industrial plant in record time were startled by summons to appear in court for working their crews on Sunday. The legislature of this commonwealth had made illegal all labor on the Sabbath day. Even with their week reduced to six working days, those in charge of the job are going to complete it within the time limit. But all contractors might not be so fortunate. It sometimes pays to consult a lawyer when entering strange territory.

MECHANICAL EQUIPMENT can cut costs only if it is kept busy. The contractors for a timber bridge decided to use air hammers for driving nails. So rapidly did they work that timber could not be placed fast enough to keep the air-hammers busy; the nails could have been driven as cheaply by hand. If the work had been planned to take advantage of the faster driving, however, profits would have been greater.

ONE OF THE BIGGEST PROBLEMS that the merchant of today has to lick is keeping his product up to date. That applies, too, to construction methods and to construction equipment and materials.

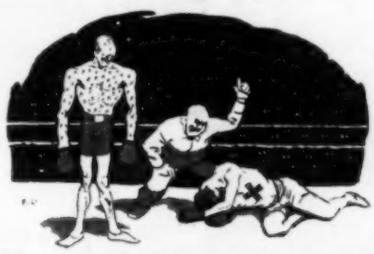
CONSTRUCTION METHODS

A monthly review of modern construction practice and equipment

PUBLISHED BY
McGRAW-HILL PUBLISHING COMPANY, INC.
TENTH AVENUE AT 36TH ST., NEW YORK

That Solar Plexus Punch

The morning after Bob Fitzsimmons had become world's heavyweight champion by knocking out Jim Corbett at Carson City, Nev., the



newspapers published outline drawings of the two fighters marked to show where the blows had landed. Fitz's picture, according to Walter Trumbull in his sports column in the New York "Evening Post," was so dotted with punch marks—one for nearly every freckle that decorated "Ruby Bob's" body—that it looked as if he had the measles; from the belt up there was almost no white space. The picture outline of Corbett, the "dancing master," supreme in his sparring ability and clever footwork, was practically unmarked. But—just above the solar plexus on the Corbett sketch was one big, black cross! That single cross marked the passing of a championship.

Some engineers and contractors merely spar with their jobs, hitting lightly at opportunities, ducking responsibilities, employing clever footwork to dance about the work in hand instead of wading into it. They never land a solid wallop in the form of a NEW IDEA to cut costs.

The field men whose work is pictured in the pages of *Construction Methods* are full of ideas. You may find just the idea to do the trick on *your* job in this very issue. Look it over carefully.

Derrick Details Wanted

On almost any job, any place, you'll recognize an old friend among the units of mechanical equipment giving faithful and varied service—THE DERRICK. Whether it operates as a stiff-leg, a guyed unit, or in such other forms as A-frames or gin poles, the derrick is there performing its basic function of handling construction materials.

Field men show great ingenuity and resourcefulness in erecting, operating and dismantling derricks, and *Construction Methods* is planning a pictorial presentation of some of these practical details of rigging, guying or general set-up. Your own work has undoubtedly developed some interesting DERRICK DETAILS. Look over the available photos on your jobs—past or present—or take a snap shot if a camera is handy—and mail the Editor (Tenth Avenue at 36th Street, New York) prints of pictures showing derrick kinks that have been effective.

Payment at regular rates, of course, for all pictures acceptable for publication.

Mental Construction

FOR the field men of construction and industry there is something to think about in the following remarks by Hugh White, president of the George A. Fuller Co., the large building construction organization.

"We have found through many years of experience that with few exceptions the beginners will not develop as they should unless they are able, after a short time with the company, to visualize a building operation as a whole. You cannot properly perform your duty as cost clerk, timekeeper, material man, estimator, assistant construction manager, superintendent, or company officer *unless you can actually build the building in your mind.*"

Many of the men who are making rapid progress up through the construction ranks make a regular practice of studying the pictorial articles in *Construction Methods.* They find that its pages help them to visualize the job as a whole—to build the structure in their own minds, as Mr. White has put it.

Facts You Should Know
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High-Early-Strength Concrete is made with the usual labor, usual materials and usual equipment—

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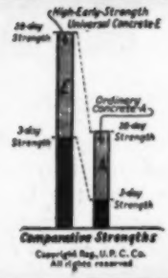

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A monthly pictorial of field practice and equipment illustrating successful construction, maintenance and material-handling methods for general construction, highways, buildings, industrial plants and public works and utilities

WILLARD CHEVALIER
General Manager
ROBERT K. TOMLIN
Editor

VOLUME 10 NEW YORK, OCTOBER, 1928 NUMBER 10

LOGGING TRACK
Machine-Laid

PINE TIES being run out to end of rail preparatory to distributing.

AFTER RAILS are laid on ties they are spiked down, and the machine moves up to the end of the track where it delivers another load.

lifting and re-laying about ½ mile of track per day. These units are mounted on standard-gage flat cars. Each consists of a steel framework with an overhead I-beam traveler extending over the end of the car. The machines are manufactured by the Vulcan Iron Works, of Spokane, Wash., and were purchased by the lumber company from the Norby & Fox Company of Portland, Ore. They carry 120 rails each, together with the necessary ties.

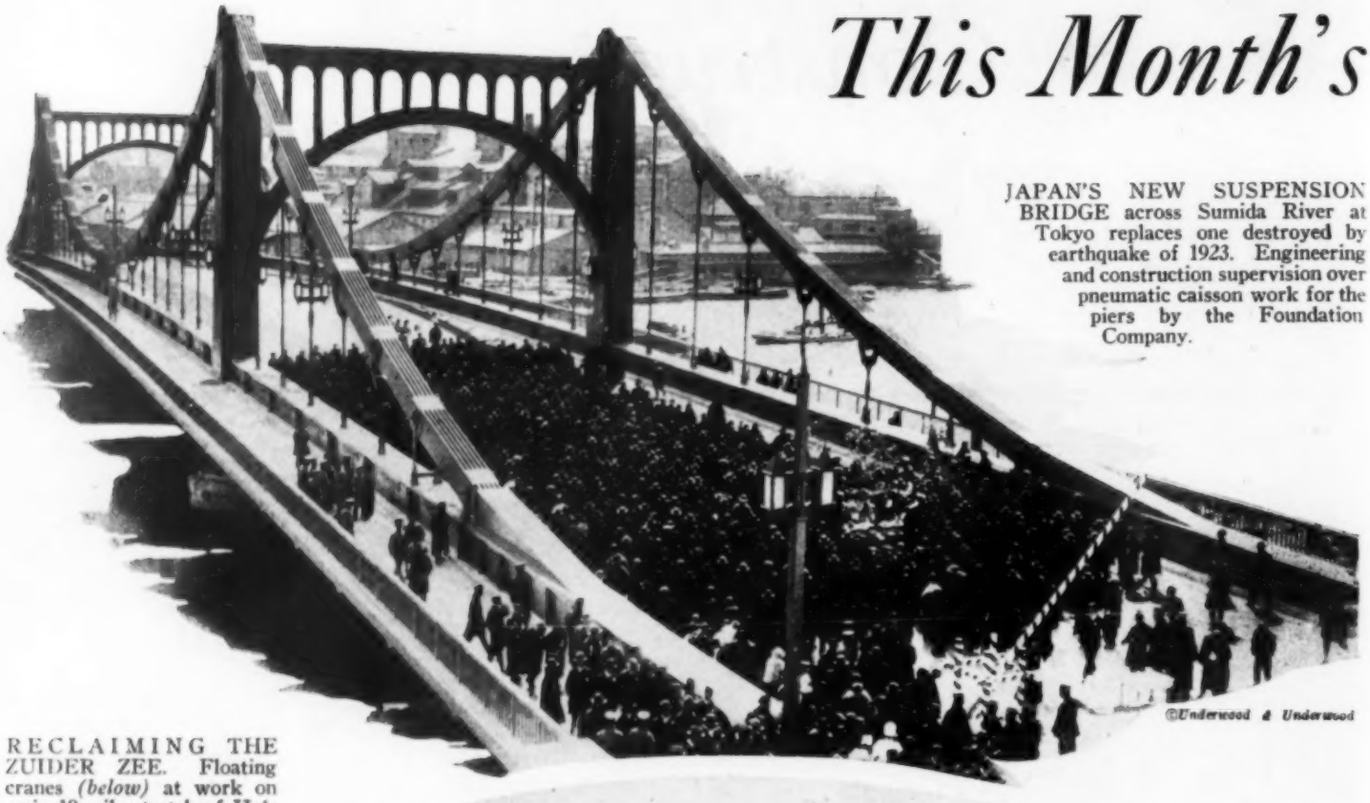
When a spur has been logged off and the logs brought down to the mill, the spur has served its purpose, so at the first opportunity the track layer and crew go back, take up the rails and move them ahead to some other spur where they are used over again.

RAIL TONGS on line from overhead traveler carry rails out to place on ties.

AN IMPORTANT feature of lumbering operations in the Pacific Northwest is the laying and lifting of railway track from forest to mill. Logging spurs and new main line track have to be built ahead of the loaders, and when the mills are cutting to capacity no time can be wasted in track-laying.

To expedite its track work, the Brooks-Scanlon Lumber Company of Bend, Ore., uses two Norby track-laying machines, each with a capacity of

This Month's



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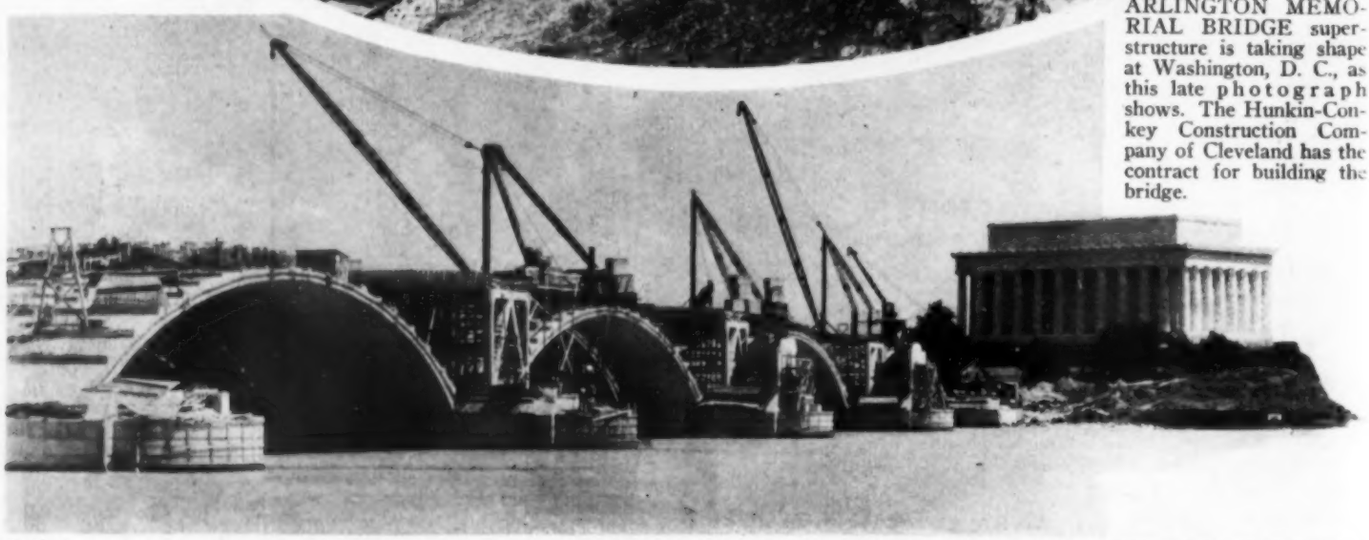
JAPAN'S NEW SUSPENSION BRIDGE across Sumida River at Tokyo replaces one destroyed by earthquake of 1923. Engineering and construction supervision over pneumatic caisson work for the piers by the Foundation Company.

RECLAIMING THE ZUIDER ZEE. Floating cranes *(below)* at work on main 18-mile stretch of Holland dike, which, when completed, will dry up 900 square miles.

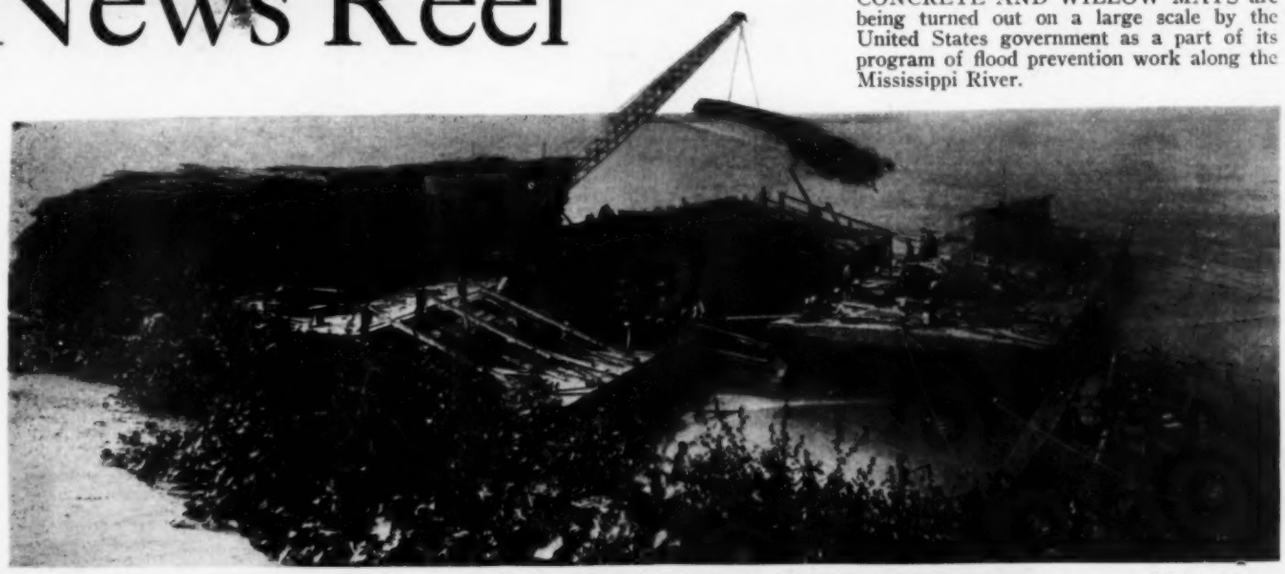
©Ewing Galloway

ARLINGTON MEMORIAL BRIDGE superstructure is taking shape at Washington, D. C., as this late photograph shows. The Hunkin-Conkey Construction Company of Cleveland has the contract for building the bridge.



"News Reel"

CONCRETE AND WILLOW MATS are being turned out on a large scale by the United States government as a part of its program of flood prevention work along the Mississippi River.



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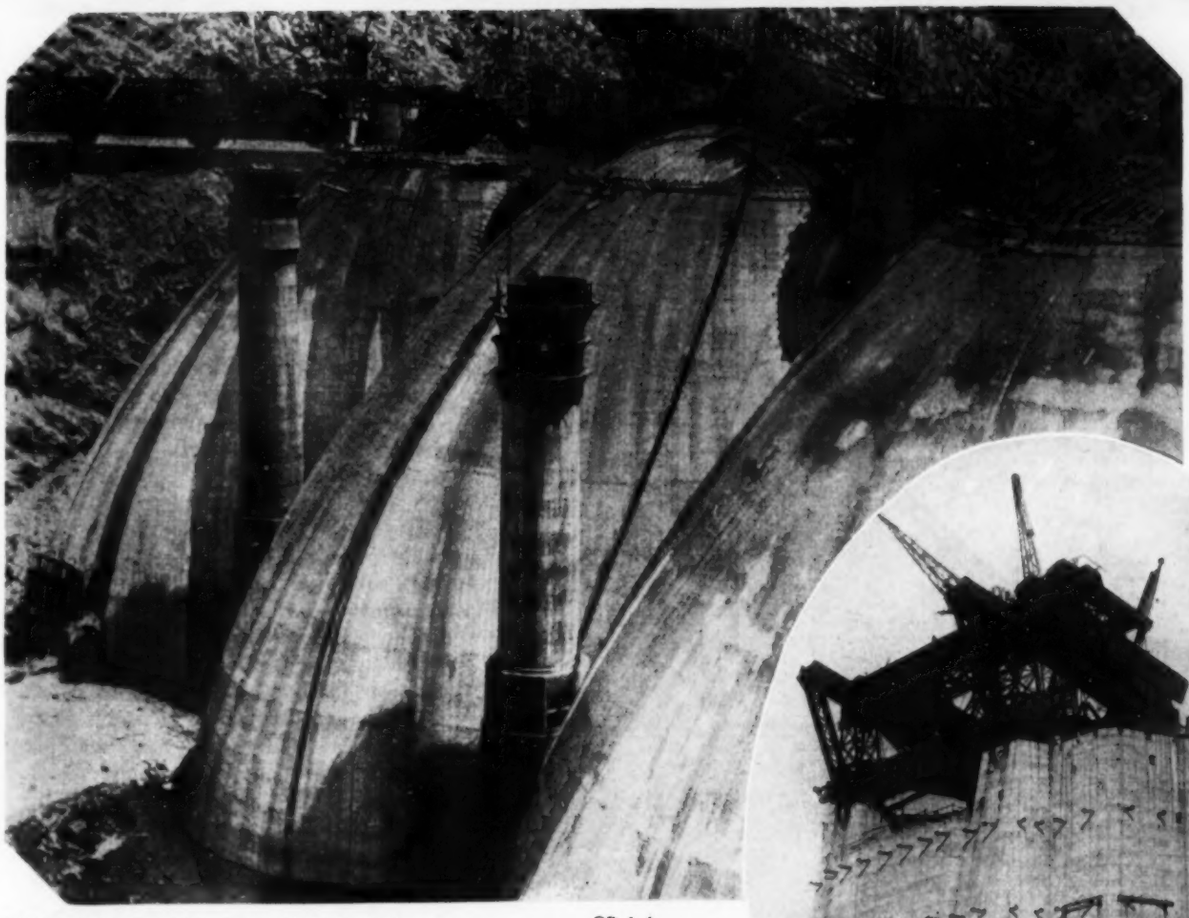

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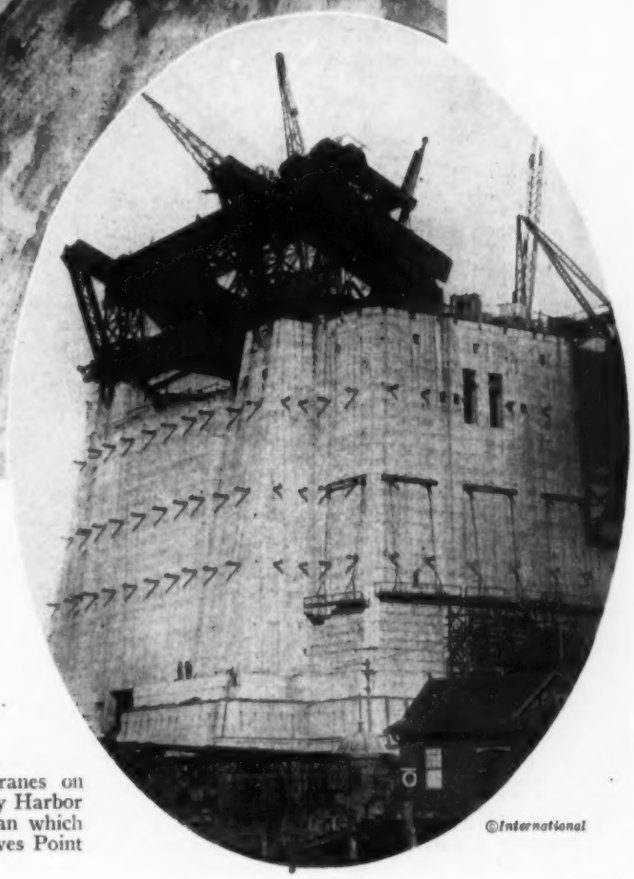
MULTIPLE-DOME COOLIDGE DAM on the Gila River, first of its type ever built, will soon be ready to supply water to 100,000 acres of land in Arizona under supervision of U. S. Indian Service. Atkinson, Kier Bros. & Spicer Company is completing the work eight months ahead of contract schedule.



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AUSTRALIA'S BIG BRIDGE. Cranes on top of main pylon on city side of Sydney Harbor bridge will erect the 1,650-ft. steel span which will stretch across the harbor from Dawes Point to Milsons Point.

DAVIS ISLANDS completed with canals, streets, parkways, and utilities. Four suction dredges still at work completing fill behind bulkhead at south end.

"TAILOR MADE" REPLACES

LEVEES and front berm were built with a 5-yd. clamshell dredge. A cast-steel bucket and powerful closing shears were needed to dig the hard mixture of shells, rock and clay that formed the bottom of the bay.

BY PLACING 13,000,000 cu.yd. of fill behind 11 miles of concrete sea wall, using a fleet of large suction dredges, 887 acres of "tailor-made" residential property in the form of Davis Islands has been reclaimed from Tampa Bay, Florida. What had been only an uninhabitable and scattered group of tide-water flats at the mouth of the Hillsborough River has been transformed into a modern community with the highest type of streets, sidewalks and sewers. Gas and water mains have been laid, a modern hospital built, and such Twentieth century necessities as yacht basins, golf course and parkways have been provided.

When in 1924 D. P. Davis and his associates began work, it must have seemed to the layman that they were undertaking an endless task. But by 1926 they had finished about half of the sea wall and had completed about half of the hydraulic fill. In that year the project was taken over by Davis Islands, Inc., and the work went ahead at increased speed under the engineering and executive management of the construction department of Stone & Webster, Inc. The sea wall and fill were finished in 1927, and at present streets and other improvements are completed.

In building the sea wall concrete sheet piles 27 in. wide, 8 in. thick and 20 ft. long were jetted into place be-

SHEET-PILE BULKHEAD, showing line of piles set 20 ft. behind bulkhead line to act as deadmen. Scaly appearance of concrete surface is due to paper used to separate piles in casting.

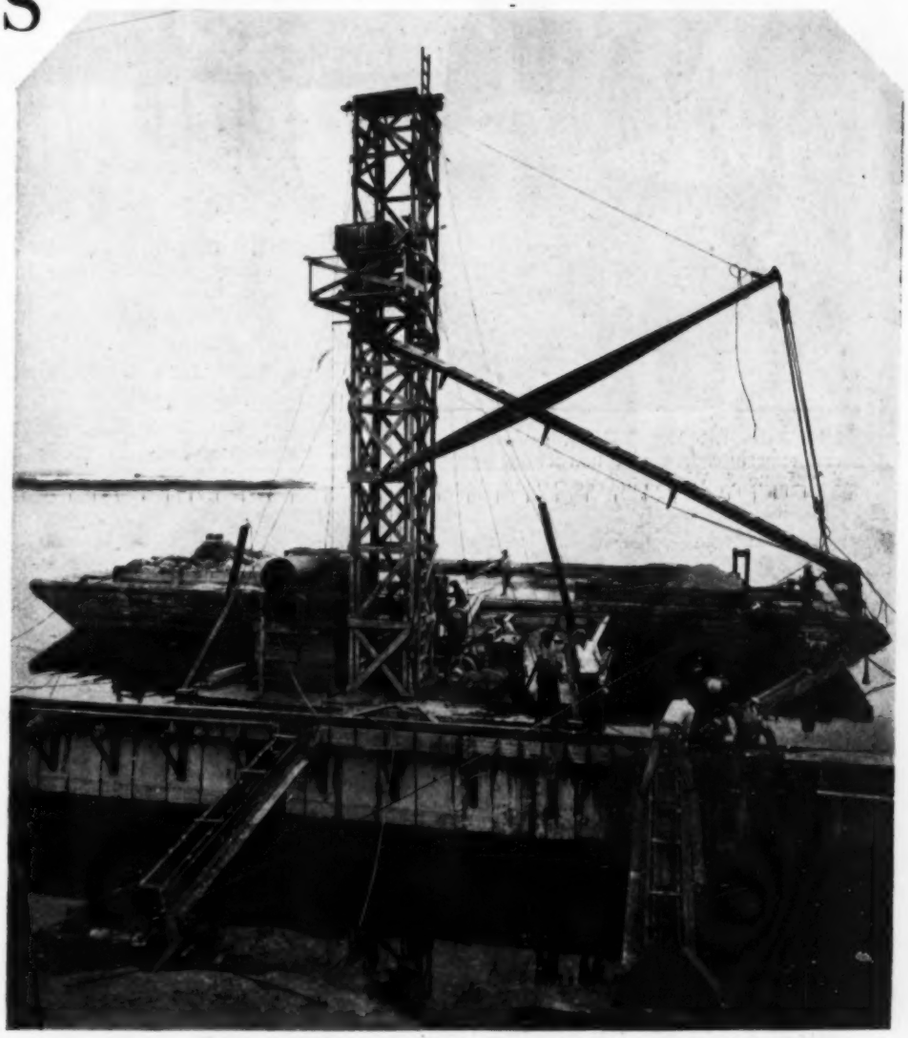
DAVIS ISLAND
MUD FLATS

tween aligning timbers on a levee brought to approximate tide level by dredging. For the banks of the canal which extends across the island similar piles were used, but they were cast only 7 in. thick.

The National Dredging Company, of Duluth, the sub-contractor, built the levees and made the backfill with a fleet of seven suction dredges (four, 20-in.; two, 15-in. and one, 8-in.) and a 5-yd. bucket dredge. The bucket dredge was used in conjunction with the three small suction dredges to build the levees to tide level for retaining the fill. After the bulkhead had been constructed on them the bucket dredge threw up a berm to El. + 2 above mean low tide and the fill was then pumped in to the level of the top of the wall (El. + 7).

All piles were cast horizontally. After each day's casting, the set, but still soft, concrete was covered by a sheet of paper, and another pile cast directly upon it. This process was continued until the piles were about nine high. After hardening, the piles were handled from the stacks by small cranes and hauled to a stiff-leg derrick by which they were loaded on a barge and towed to the site of the work where three P. & H cranes handled the piles during the jetting operations.

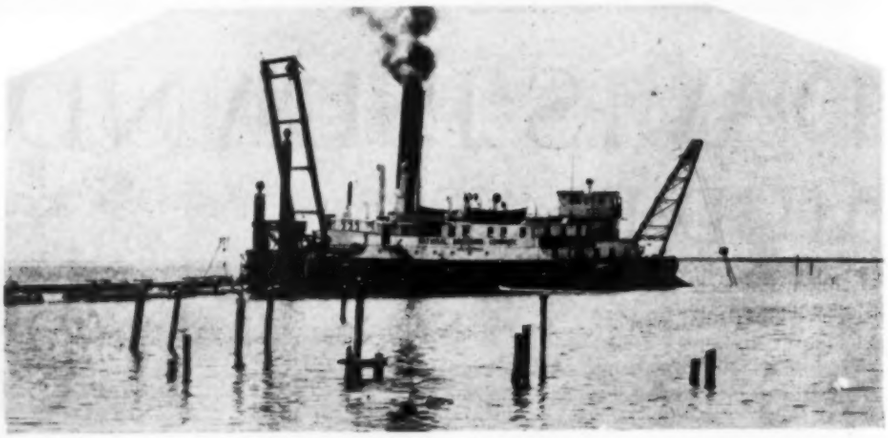
All of the casting yard equipment was electrically operated. Among the items of equipment were one 1-yd. and



FLOATING MIXING PLANT was used to pour the reinforced tie-back between the bulkhead and deadmen, as well as the coping of the wall.

PILE-CASTING YARD, under Stone & Webster management, was so arranged that sacked distributed by carts on runways laid on forms. The seasoned piles were hauled by mule to the

CHURCHILL MacCUISH, general superintendent of construction for Stone & Webster.

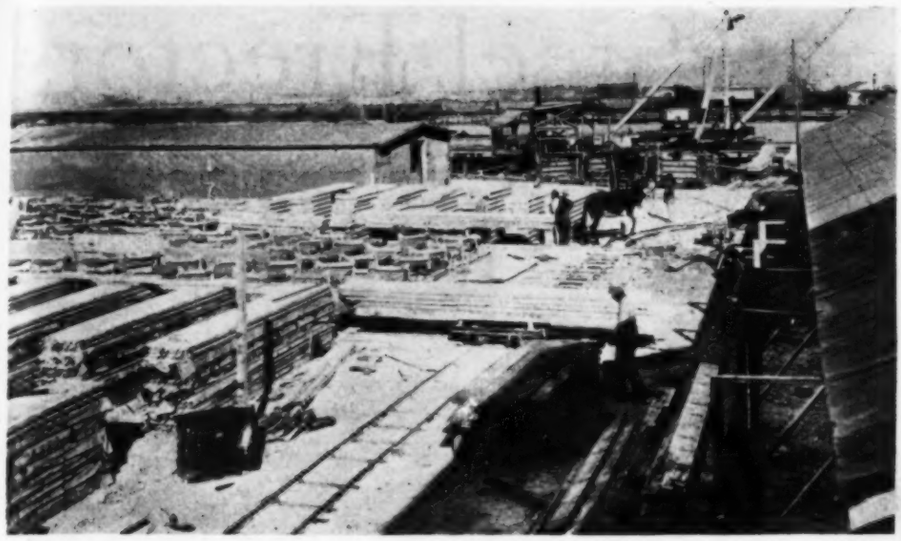


SUCTION DREDGE, one of the four 20-in. units of the National Dredging Company, Duluth. Three smaller suction dredges were also used on this work.

one ½-yd. mixer, a belt conveyor 175 ft. long, a 24-in. gage track, a bucket elevator and a stiff-leg derrick.

Included in the physical development of the island are 26 miles of streets which vary in width from 24 to 60 ft. to suit the expected traffic. The sub-contractors on this work were Davis, Miller & Cobb, Inc., of Tampa. Among the other items built or under construction are 101,000 ft. of 6 to 27-in. concrete pipe for a sanitary sewerage system; 44,000 ft. of concrete storm sewers, 10 to 30-in. in diameter; 103,000 ft. of 6 to 16-in. cast-iron

IN THE MIXING YARD the aggregates were dumped from trucks into their proper bins from a runway. These bins fed into the boot of a bucket elevator equipped at the top with a swivel spout.



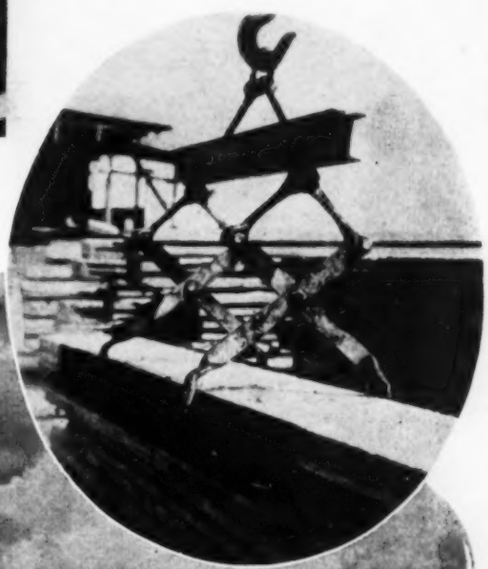
cement was carried from shed to mixer by belt conveyor. Concrete was derrick (at extreme right) which loaded them onto the barges.

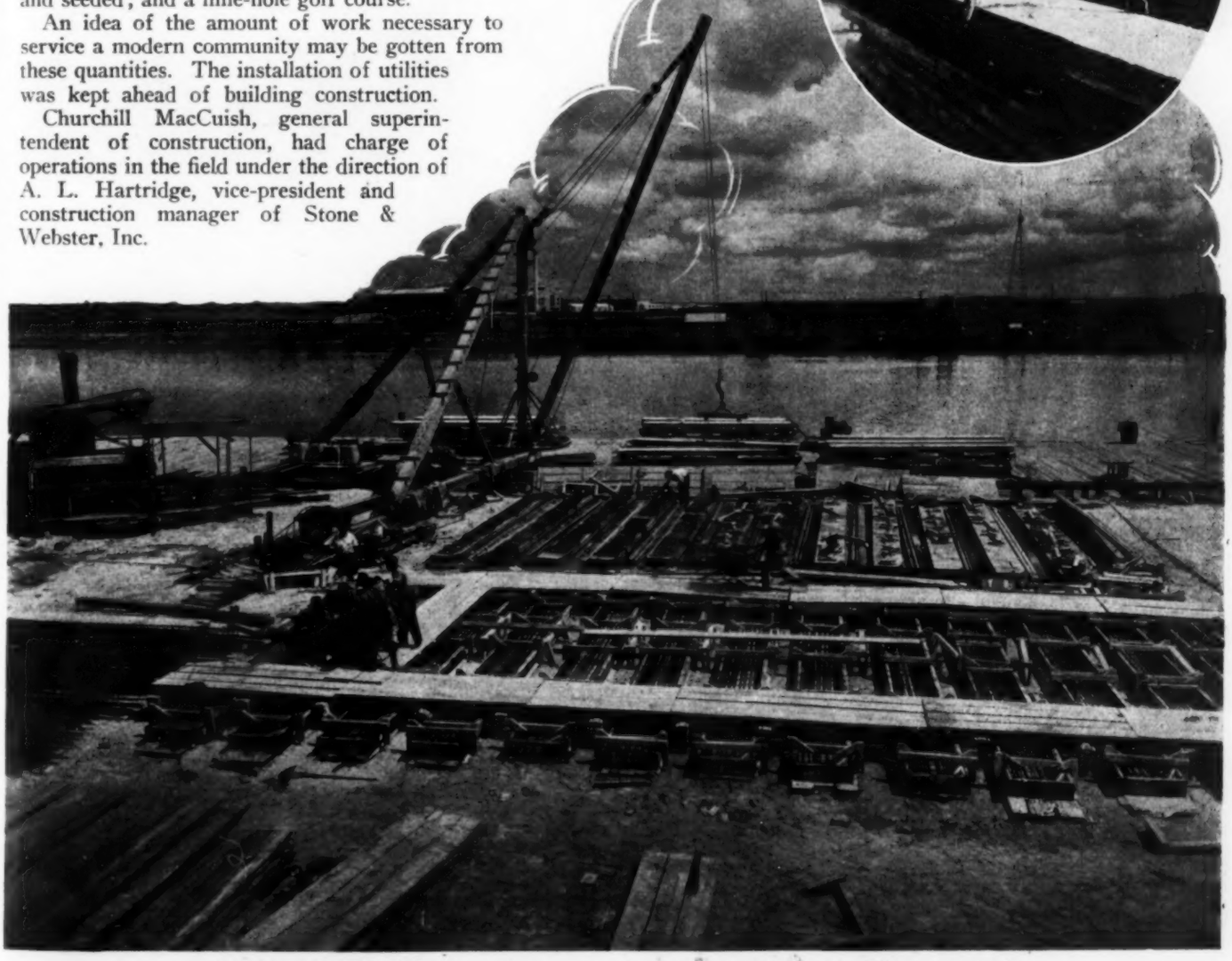
COMING: A pictorial article on the first stages of constructing the world's largest earth dam for impounding water for hydroelectric power. This story will describe the four 16-ft. diameter penstocks and the 48x23-ft. diversion conduit for the Lexington Water Power Company's project on the Saluda River, near Columbia, S. C. The dam served by these conduits—208 ft. high, 1½ miles long and ¼ mile thick at the base—will contain 11,000,000 cu.yd. of earth fill.

water pipe; 105,000 ft. of 4 to 8-in. gas mains; 864,000 sq.ft. of sidewalks 4 to 10 ft. wide; 208,000 lin.ft. of curbing; 300,000 sq.yd. of parkway which will be graded, top-soiled, fertilized and seeded; and a nine-hole golf course.

An idea of the amount of work necessary to service a modern community may be gotten from these quantities. The installation of utilities was kept ahead of building construction.

Churchill MacCuish, general superintendent of construction, had charge of operations in the field under the direction of A. L. Hartridge, vice-president and construction manager of Stone & Webster, Inc.



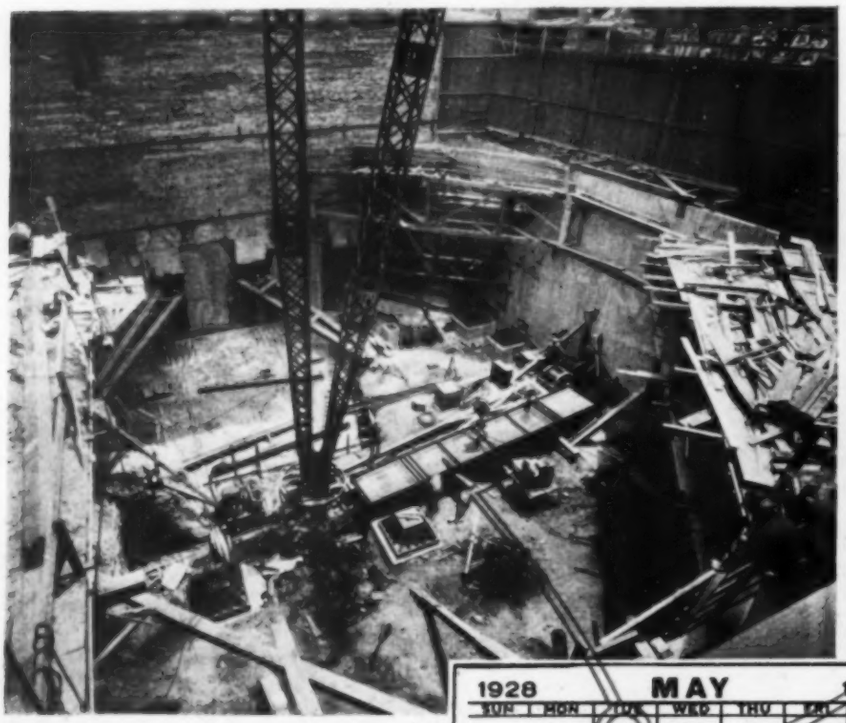


FORMS and steel reinforcement for concrete sheet piles at casting yard. Piles were cast in tiers nine piles high with sheets of paper separating units. (*In oval*) SPECIAL TONGS were devised to handle the piles.

Steel Erectors

A TEN-STORY structure being used as an addition to Bullock's department store is now completed and represents a new record in speedy construction, according to the American Institute of Steel Construction.

The old buildings on this site, at the corner of Seventh and Hill Streets, one of the busiest corners of Los Angeles, were demolished last April. The finished piers for the beams were in place the first of May, and by the first of June all of the steel framing was in place. Goods were actually bought at Bullock's on the third



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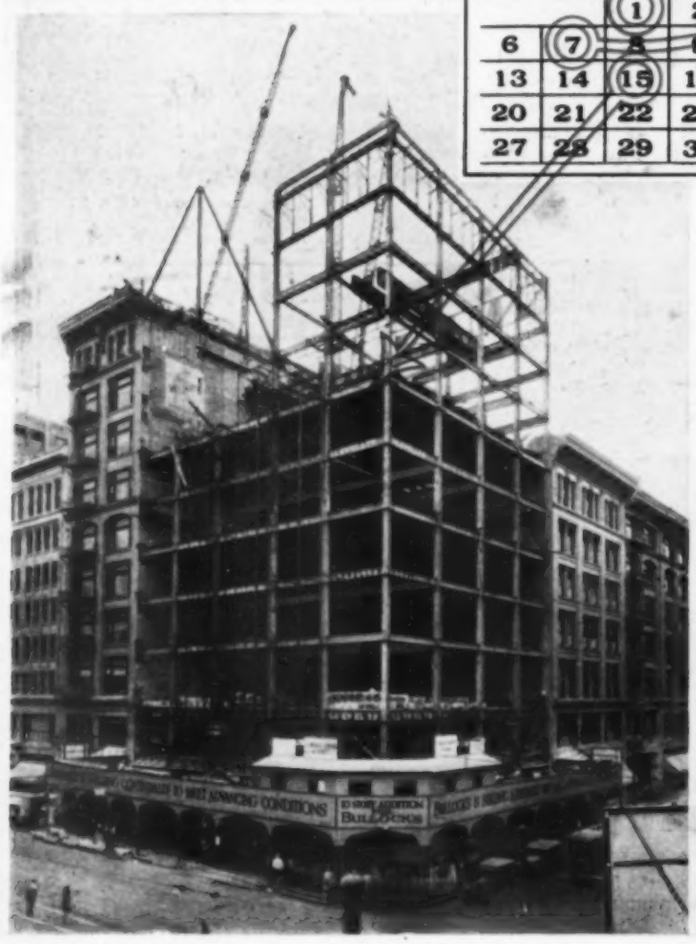

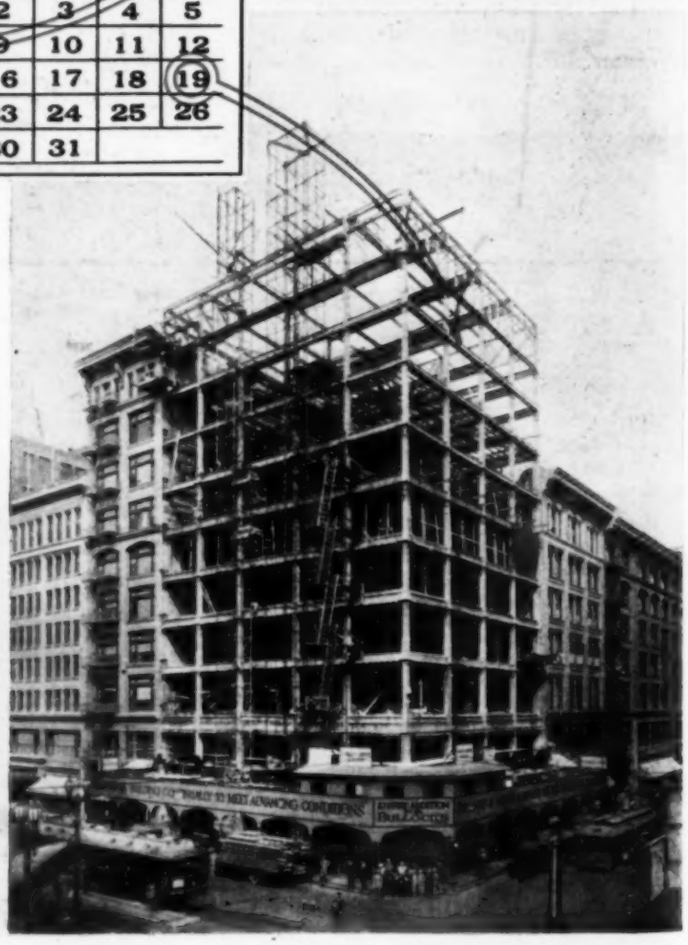

Set New Record

floor of the new building on July 6.

The structural steel in this building, amounting to 1,172 tons, was erected in fifteen working days, according to the Llewellyn Iron Works of Los Angeles who were responsible for the job. The P. J. Walker Company was the contractor, and John Parkinson and Donald B. Parkinson were the architects.

The American Institute of Steel Construction points to this particular erection in Los Angeles as evidence of the improvement in speed in steel construction brought about by the standardization work of the Institute.

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Wanted: Derrick Details

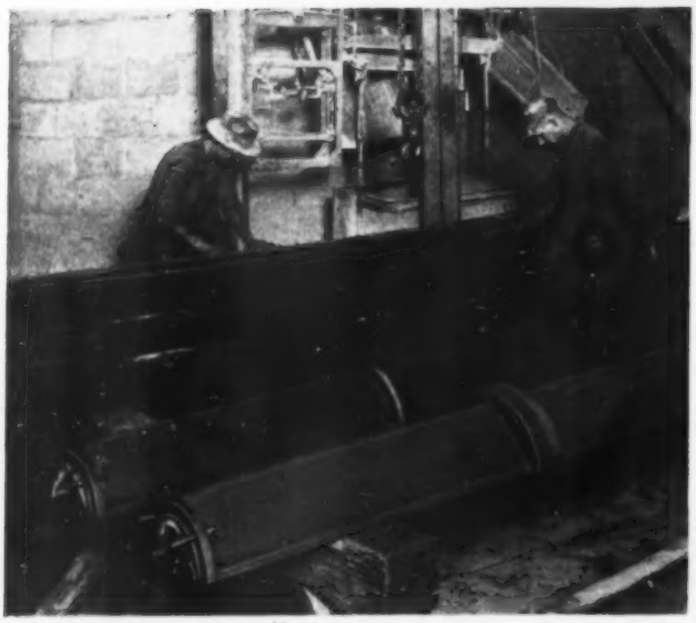
In an early issue *Construction Methods* plans to publish a group of pictures on "Derrick Details" — ingenious or unusual set ups, special methods of guying or rigging and other devices or kinks that field men have found helpful on the job.

Haven't you a photo of some interesting derrick detail on your work that you can mail to the Editor (Tenth Avenue at 36th Street, New York) for this group of pictures? A good snap shot that tells the story at a glance is what is wanted. Payment at regular rates for all derrick detail pictures acceptable.

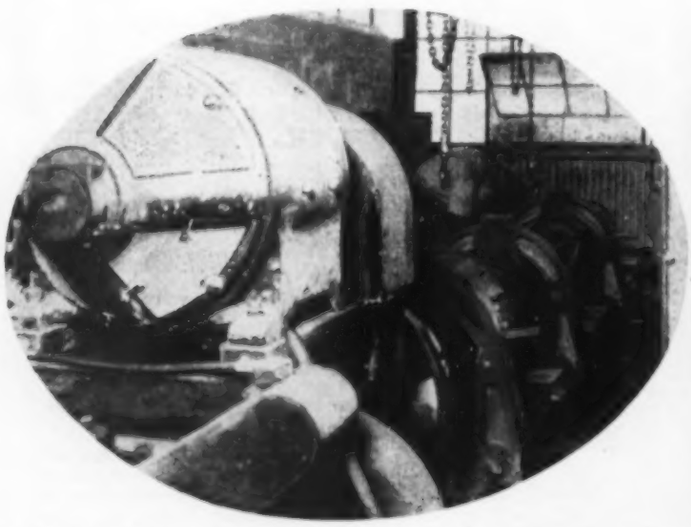
Send in yours today.

Step-by-Step How Standards for Are Made

1 FOR LIGHTING its downtown district the city of St. Louis this year undertook an extensive installation of precast concrete poles of the "Hollowspun" type. In making these standards at the St. Louis plant of the Westinghouse Electric & Manufacturing Company, the first operation consists of assembling the "cage" of steel reinforcement on a mandrel form.



2 THE MOLDS *(above)* for the 24-ft. poles are heavy machined split castings into which the cages of steel reinforcement are placed. The two halves are then clamped together.



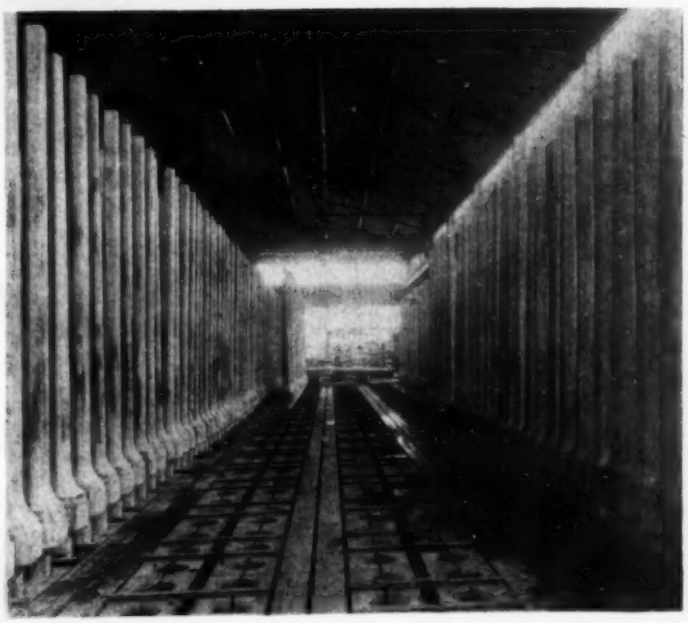
4 A ROTATING MACHINE *(above)* then receives the concrete-filled molds and spins them for 20 min., forcing the heavy part of the mixture against the inside surface of the forms and forming a hollow core at the center.

3 A CONCRETE MIXER *(below)* discharging into an inclined chute, fills the molds while they stand upright with their tops at floor level. When full, end plugs are bolted into place.

5 AFTER SPINNING *(left)* and steam treatment to set cement quickly, the end plug is removed and the split halves of the mold are stripped off. Note hollow core at center of post formed by centrifugal action of rotating mold.

Field Methods

Electric Lights and Placed



6 CURING ROOM *(above)* where poles, standing on end, are sprayed for 28 days to prevent too rapid drying of surface. Each pole is held in an individual socket.

7 AN ACID TREATMENT *(below)* applied by brush, removes surface film and produces texture resembling granite.

8 SETTING THE POLES *(right)* with the aid of a special swinging-boom rig on a motor truck. The St. Louis lighting project involves an expenditure of $8,000,000. The work is in charge of John C. Pritchard, director of the Department of Public Utilities.

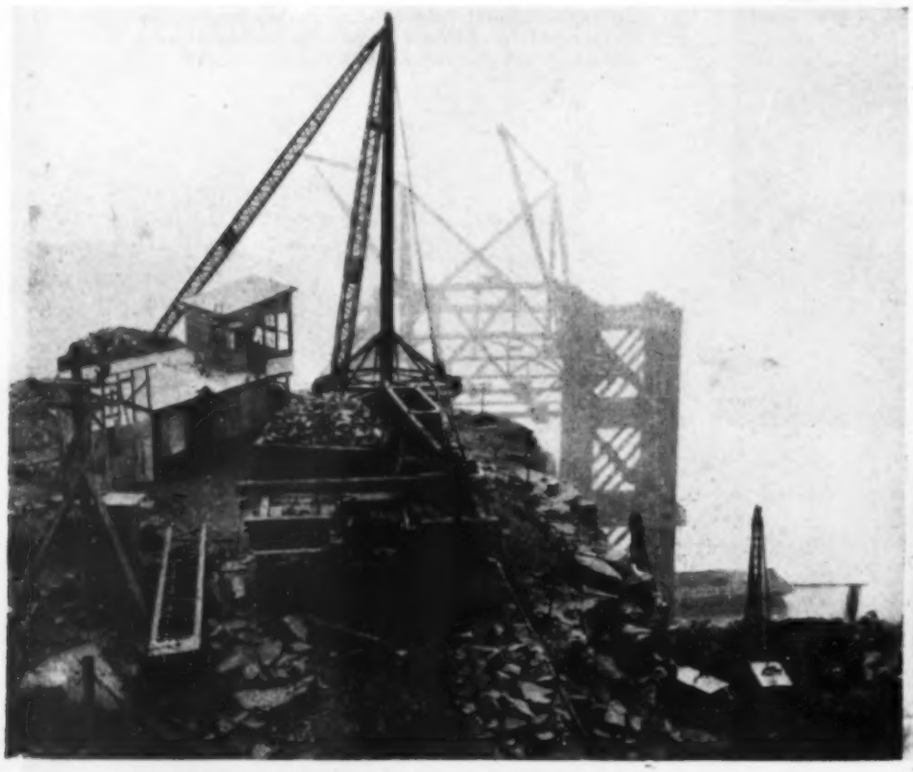
M. B. CASE, construction engineer in charge for the Port of New York Authority.

BIG CUT through rock forms bridge approach. Shovel and crane in foreground handle material into skips. Well-drill rigs for deep blast holes at left.

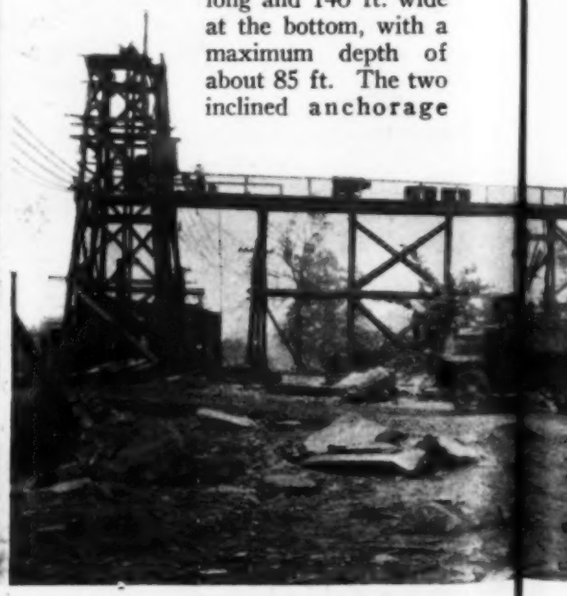
Heavy Cut in Rock HUDSON RIVER

METHODS and equipment usually associated with quarrying and mining operations, rather than with bridge construction, are helping Foley Bros., Inc., contractors, of Minneapolis, speed the work of preparing the New Jersey approach cut and cable anchorage tunnels for the $75,000,000 Hudson River suspension bridge between Fort Washington, N. Y., and Fort Lee, N. J., the largest single project in the comprehensive plan of the Port of New York Authority. The bridge, with a main span of 3,500 ft. and approach spans at each end of 650 ft., reaches the Palisades on the Jersey side at an elevation necessitating an approach cut through rock of about 170,000 cu.yd., in addition to some 24,000 yd. of rock excavation in a pair of inclined tunnels and pits, which, when plugged with concrete, will provide anchorage for the great steel cables that will support the bridge roadway.

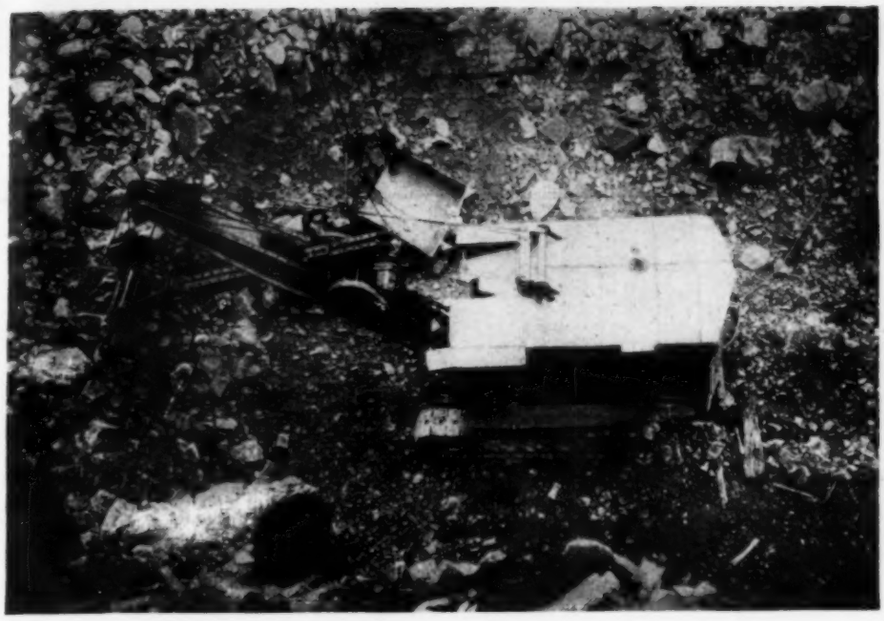
The approach cut for the west end of the bridge is approximately 800 ft. long and 146 ft. wide at the bottom, with a maximum depth of about 85 ft. The two inclined anchorage



STIFF-LEG DERRICK on north promontory of cut raises blasted rock in skips for delivery to crushing plant.



HEADFRAME over shaft for anchor-cars deliver tunnel muck to crusher



LOADING rock from the 85-ft. cut into skips with a 1¾-yd. electrically-operated power shovel which moves about on crawler treads. Skips are hoisted by two stiff-leg derricks.

JOHN R. HOLMES (*left*), superintendent, and J. T. MAYR, engineer for Foley Bros., Inc.

Cleaves Palisades for BRIDGE APPROACH

tunnels (one for each bridge cable) are each about 167 ft. long with widths tapering from 44 to 26 ft. and heights from 60 to 37 ft. Each tunnel, at its upper end, flares out into a large anchorage pit.

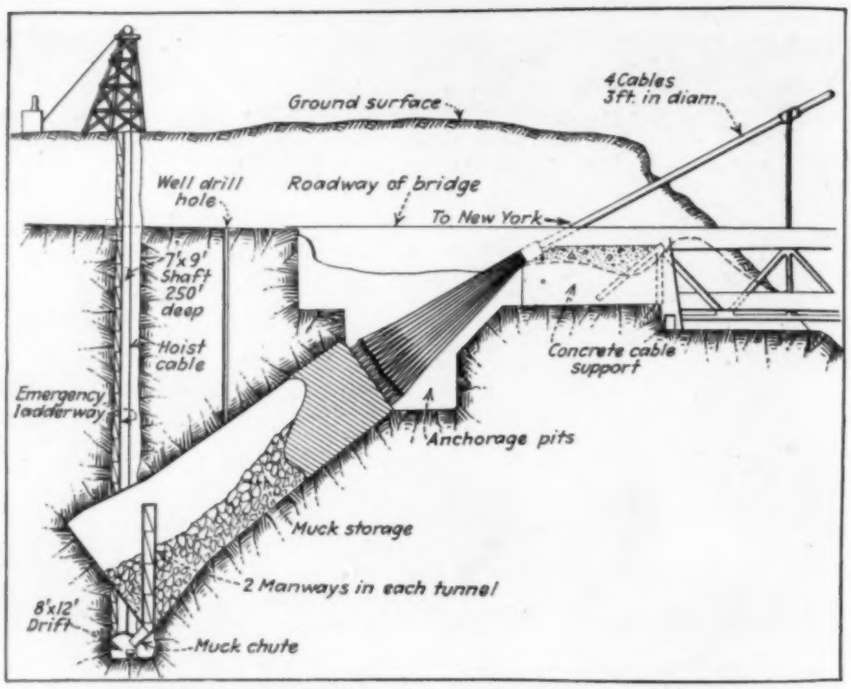
Approach Cut—The rock excavation in the big approach cut is being handled by Superintendent John R. Holmes and Foreman Oscar Carlson as a large-scale quarrying operation. Lines of vertical holes 8 in. in diameter and approximately 40 ft. deep are drilled with three Cyclone well rigs, and are loaded and shot in groups to break down the material along a wide bench, from which it is loaded into skips by a 1¾-yd. Marion electric shovel and hoisted to the surface by a pair of American stiff-leg derricks with 3-drum electric hoists, one mounted on each promontory at the river side of the cut. A time-saving detail of this part of the work is the use of a 3,500-lb. weight or "skull-cracker" on a line from a Northwest crawler crane to break up pieces of blasted rock too large for the shovel and skips to handle. This method, the contractor has found, is preferable to block-holing with explosives, for with the skull-cracker there is no lost time for the labor force while loading and firing shots.

age tunnels (*left*) and runway over which (*right*).

SWINGING A SKIP-LOAD of rock from the cut with the stiff-leg derrick on the south promontory.

Rock-Crushing Plant—The derricks raise the blasted rock from the cut to elevated loading platforms at either side, from which the muck drops by gravity into Mack trucks for delivery to a large stone-crushing plant operated at the site by the contractor who sells the crushed stone from both the open cut and the tunnel excavations to a local road-building contractor. The crusher plant is equipped with one 40x48-in. Buchanan jaw unit, two Telsmith gyratory breakers and two Telsmith reducers, all electrically operated by General Electric motors.

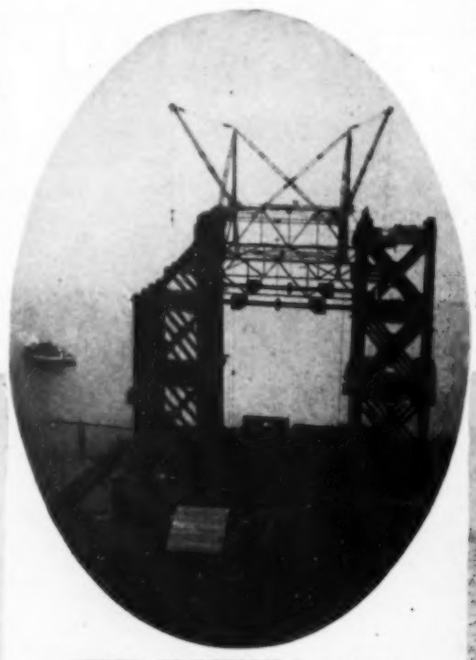
Anchorage Tunnels—The two anchorage tunnels (106 ft. apart on centers), each at a slope of 37 deg. with the horizontal, are excavated from the bottom upward. For this part of the work the contractor first sank a 7x9-ft. shaft 250 ft. deep and from it extended a horizontal drift or cross-cut tunnel 250 ft. long and 8x12 ft. in section to provide points of attack from which the two inclined tunnels or "raises" could be carried upward to the surface through the hard basalt rock. Drilling is done with Ingersoll-Rand equipment in the form of both stoping drills and drifters mounted on vertical columns. The method developed by C. C. Freeman, general tunneling foreman, was essentially a top heading and bench scheme with certain modifications necessitated by the slope of the bore and the exceptionally large size of the huge subterranean cavern. From 80 to 100 drill holes, ranging in length up to about 18 ft. are shot for each advance of the heading. Muck is piled up on the inclined slope (the amount stored varying from 2,000 to 4,000 yd.) and fed by gravity into inclined chutes delivering to cars in the cross-cut tunnel.



ANCHORAGE TUNNEL section, showing shaft, cross drift, and general scheme of excavation, with muck stored on incline.

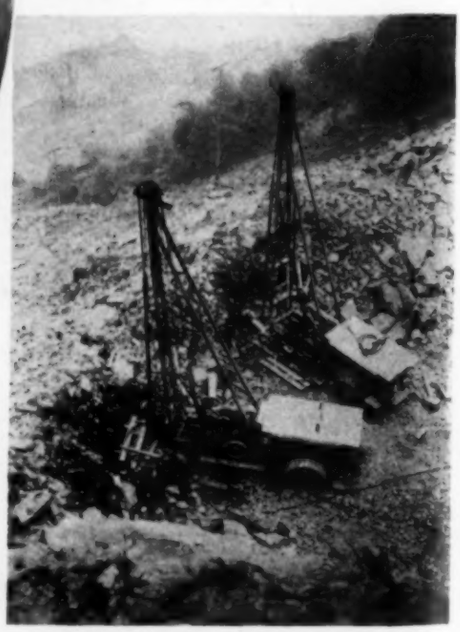
Across the cavity are strung steel cables fastened to eye-bolts in the tunnel side-wall. Horizontal planks with one end supported on the loading floor and the other on the transverse cables, serve as platforms for the drilling crew. An inclined cableway extends upward from the bottom of the excavation and serves to deliver bulky materials to the heading. An unusual expedient is employed by Tunnel Foreman Freeman in the form of 8-in. well holes which he drilled from the ground surface down through the roof of the anchorage tunnel caverns. Through these well holes all of the drill steel and the explosives are lowered in long well buckets direct to the workers.

The air compressor plant serving the tunnels comprises two 800 cu.ft. per minute stationary Ingersoll-Rand machines electrically driven by General Electric synchronous motors. For sharpening drill steel the contractor is using two machines, an Ingersoll-Rand and a Sullivan unit. A detail, devised by Superintendent Holmes, which has proved valuable in sorting and handling sharpened drill steel is the rack illus-



STEEL ERECTION in progress on west tower of Hudson River suspension bridge.

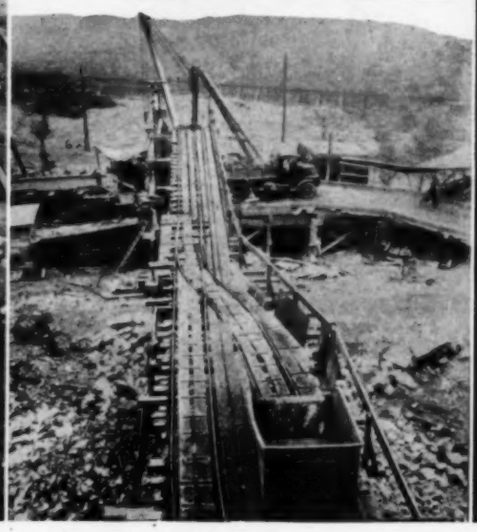
PLATFORM under derrick aids loading of motor trucks with rock delivered in skips.



BLAST HOLES in the approach cut were put down to 40-ft. depths by well-drill rigs.

JOB KINKS ON
Hudson River Bridge
Approach and Anchorage

HOOK on line from gasoline hoist dislodges rock chunks too big for crusher feed opening.



TRACK LAYOUT on trestle from shaft headframe to dump over crusher, showing siding for empty cars.

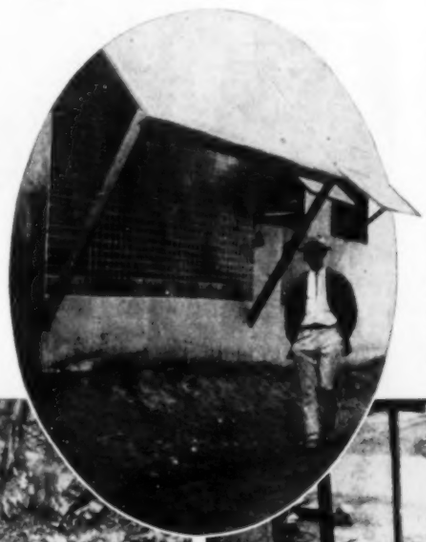
SAFETY FIRST. Steel shafting, pivoted at end, is moved across hoistway by cable from lever to form landing seat and stop for hoist cage. (Cage not shown.)

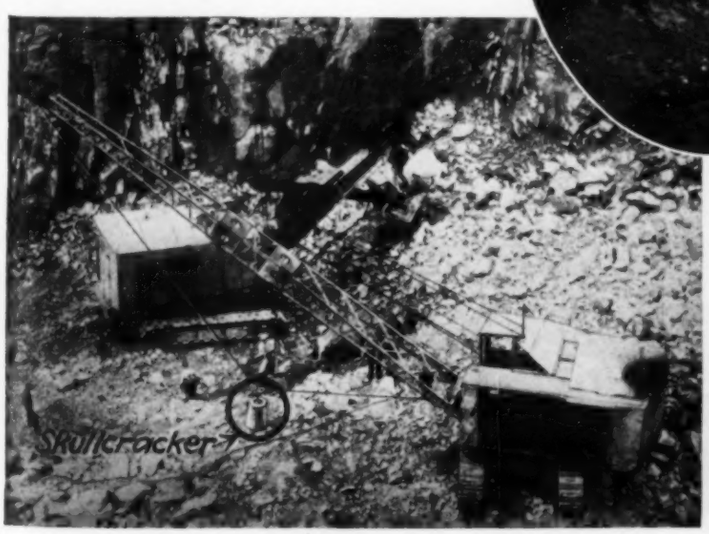
trated herewith. It is a horizontal wood framework with compartments properly labeled for drill steel lengths of 2, 4, 6, 8, 10, 12, 14, 16 and 18 ft. From this rack drill steel of the desired lengths can be obtained without delay.

The general scheme of handling the inclined tunneling operations is illustrated in the sketch on p. 16. Muck from the heading and bench passes downward to a chute at the bottom which delivers into 1½-yd. Koppel quarry cars on narrow-gage track in the cross-cut tunnel. These cars are pushed to the shaft bottom, raised by a Lambert steam hoist and run along a wooden trestle to a dumping point over the large rock crusher previously noted. Here a large steel hook on a line from a Clyde gasoline hoist (see above) has proved a convenience in dislodging large chunks of rock that stick in the crusher jaws.

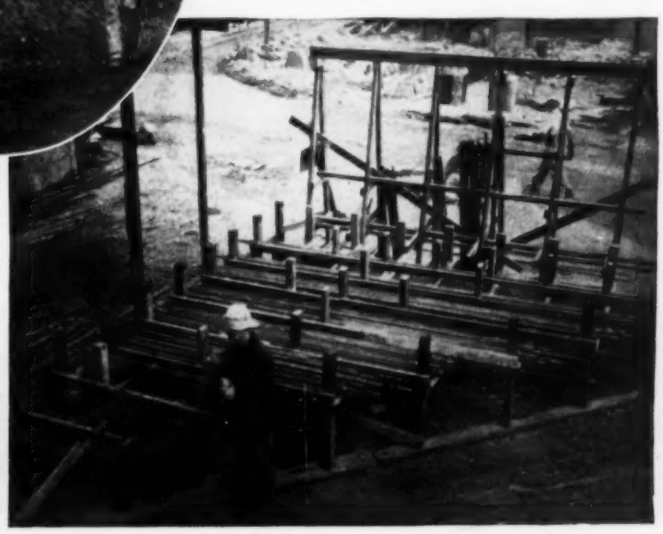
Personnel—For the Port of New York Authority, O. H. Ammann is bridge engineer; M. B. Case, engineer of construction; F. E. Cudworth, resident engineer on the Jersey side; Robert Hoppen, Jr., resident engineer on the New York side, and A. B. Lincoln, chief of party. For Foley Brothers, Inc., of Minneapolis, the contractors, John R. Holmes is general superintendent; J. T. Mayr, engineer of construction; C. C. Freeman, tunnel foreman, and Oscar Carlson, open cut foreman.

DRILLER'S SCOREBOARD. (*Below*) Footage drilled daily by each worker is posted opposite his name.



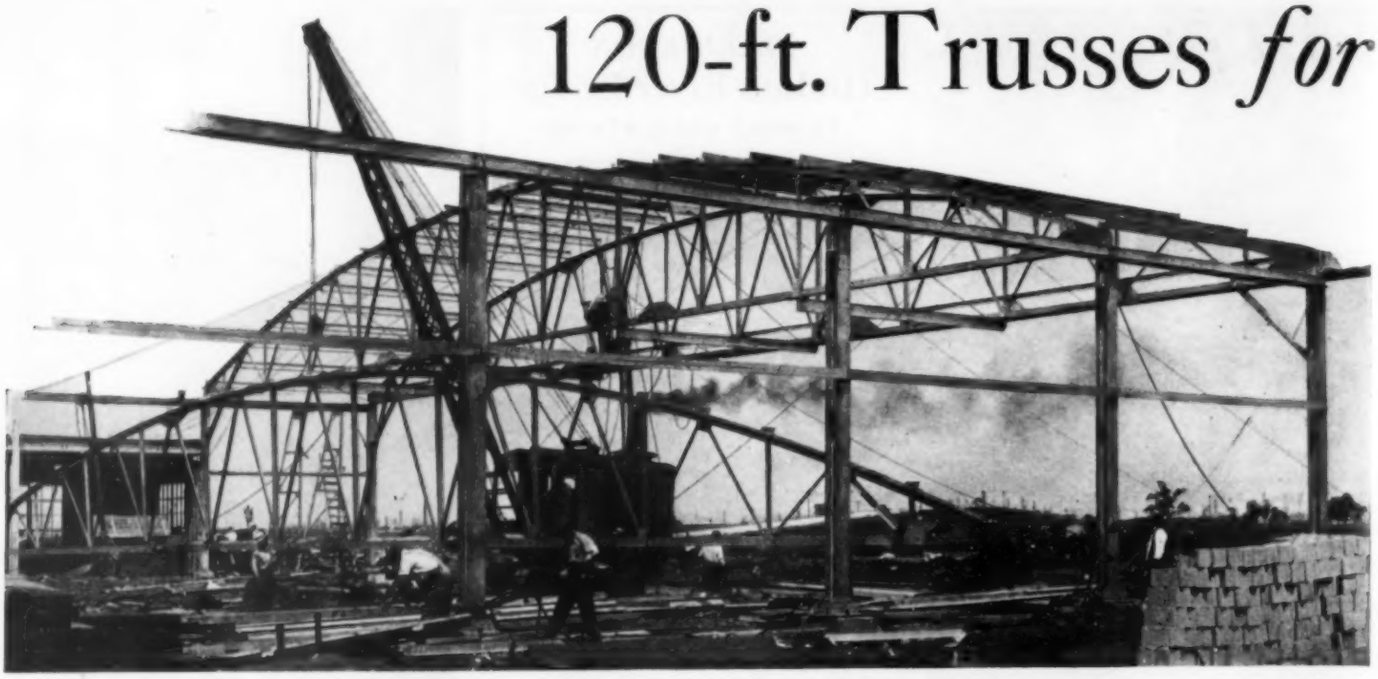


SKULL-CRACKER, a 3,500-lb. weight on line from crane, breaks large rock pieces into sizes for handling by skips.



DRILL STEEL RACK with separate compartments for each set of lengths up to 18 ft.

120-ft. Trusses *for*



THE 120-FT. TRUSSES, made up of three shop-fabricated sections bolted into a unit on the job, were raised to place by a crawler crane.

© P. & A.

AS PART of the comprehensive plan for the development of the Port Newark (N. J.) terminal project, the city's Department of Public Affairs, under the direction of James W. Costello, chief engineer, is completing work on an airport to occupy an area of 350 acres reclaimed from the Newark meadows. During the progress of extensive filling and grading operations (to be illustrated in a forthcoming issue of *Construction Methods*) there has been erected the first of a number of structures necessary for administering the airport and housing and servicing the planes that will use the new landing field.

This building is a steel-frame hangar, occupying a ground area 120 ft. square, with roof supported by steel bowstring trusses 120 ft. long, giving a floor area unobstructed by columns for the handling and housing of airplanes.

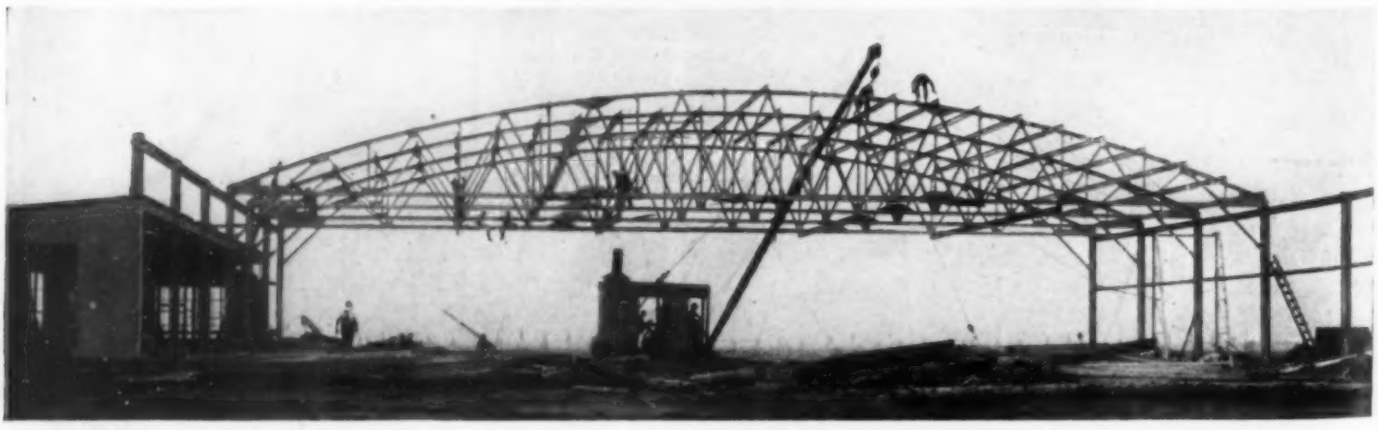
NAILING STRIPS, of wood, are bolted to the purlins for the roof decking.

Following a general design prepared by Mahlon W. Parsons, Jr., principal assistant engineer of the Newark Bureau of Docks, stock sizes of Massillon steel products for the structural framework of the building were shipped to the site from the plant of the Macomber Steel Company of Canton, Ohio.

The main truss members consist of conventional double-angle top and bottom chords. Angles and plates serve for the web and end construction. The trusses, columns and all other structural steel members for the hangar are painted with Albron pure aluminum bronze paint furnished by the Aluminum Company of America.

Columns are built up from standard H sections with standard cap and base details.

At one end of the hangar has been built a lean-to with masonry walls to



NO COLUMNS or other obstructions will interfere with the handling of aircraft within the completed hangar.

Airplane Hangar

house work shops, store rooms and offices.

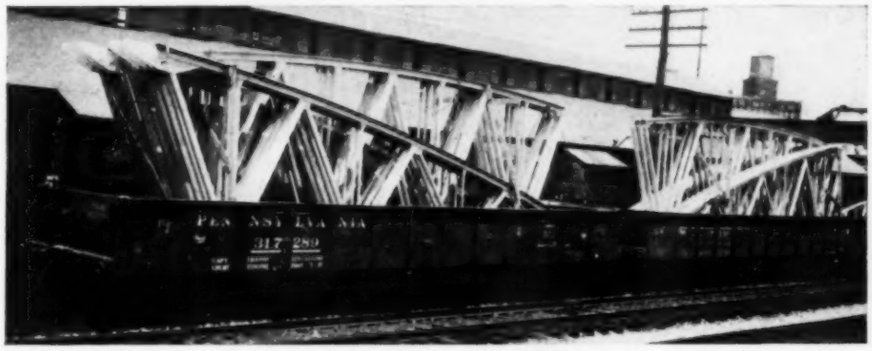
The trusses, as shown in the illustrations, have curved top chords with a height of only about one-tenth of the span and were shipped to the job in gondola cars. The 12 ft. 7-in. depth of the trusses, however, called for special railway routing to insure proper clearances during the trip from mill to job. Each truss was fabricated in three sections by riveting at the steel company's shops and was assembled into a unit by bolting on the job, thus minimizing the amount of field fabrication. The trusses are supported by 20-ft. steel columns on 20-ft. centers, all field connections being bolted. Steel purlins, to which wooden nailing strips are bolted, support the roofing.

On arrival at the site, the three units of each 120-ft. truss section are bolted together on the ground and a long timber is lashed temporarily to the bottom chord to act as a stiffener while the truss weighing 6 tons is raised to place on its columns by an Erie steam crawler crane. As the trusses are erected, the construction crew follows along with the work of setting the steel purlins, preparatory to placing the roof-deck.

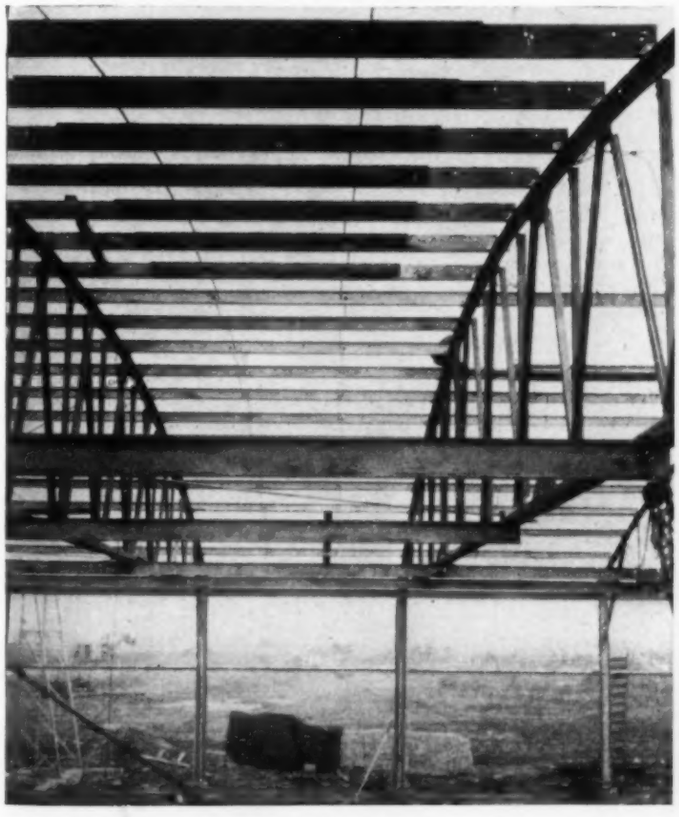
The general contract for the construction of the Newark Airport hangar was awarded to the Shore Construction Company of Newark, N. J., for whom W. L. Disbrow was in charge of field operations. Erection of the steelwork was handled by the Macomber Steel Company's forces under the direction of Vincent B. Moore. General supervision of the field work for the Municipal Bureau of Docks was in the hands of A. H. Armstrong, assistant engineer.

In addition to the hangar, work is in progress on the landing field, involving a drainage system in addition to a large amount of fill and grading. Runway and street construction are other features of the airport development.

STEEL PURLINS were raised to place by locomotive crane and bolted to the top chords of trusses.



SHIPMENT of trusses in three sections was handled by standard railway equipment. Truss depth is 12 ft. 7 in.



PURLINS in place ready for roofing, showing wood nailing strips bolted to steel members.

STIFFENER, in form of long wood pole, was lashed to bottom chord while truss was being raised to place.

Settling Fills

How Minnesota Highway Grading at Sink

SHOOTING a group of holes to settle a fill that will carry a concrete-paved highway over swampy material.

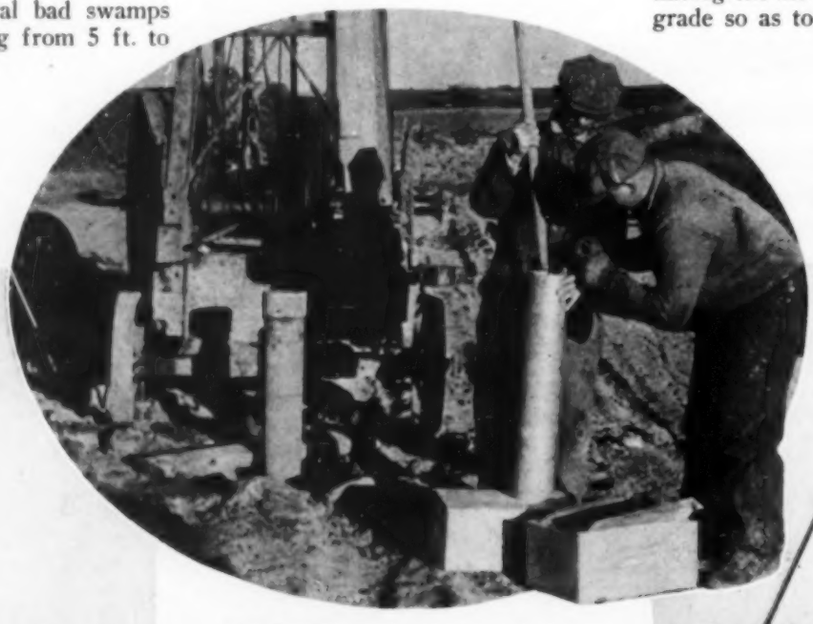
RESIDENT Engineer J. C. White of the Minnesota Highway Department has been experimenting with different methods of settling fills through swamps with deep soundings. An abstract of a report which he prepared for the Hercules Powder Company follows:

We have had several bad swamps with soundings running from 5 ft. to 30 ft. of peat to solid bottom. It was our desire to settle these fills to solid bottom during the grading so that there would be no large amount of settlement afterwards, as the grade is to be paved next year with one-course concrete.

Our method at the start was to build our dump out over the swamp from 1 to 6 ft. above grade. With 4-in. post augurs we bored holes 30 ft. apart on the center line of the dump down to solid bottom. These holes were first sprung with from 2 to 6 sticks of 60 per cent gelatin, cleaned out and reloaded with from 50 to 150 lb. of 40 per cent gelatin. The reloaded holes, primed with electric blasting caps, were then shot in groups of four or five. After the fill rose into the air from 2 to 4 ft. as the result of the firing, it dropped back into the vacuum caused by the shot, bringing the top of the fill level with the swamp surface and creating a solid core down to hard bottom. The follow-down, after the shot, was better with a sand than with a clay dump.

The action of the shots, Mr. White explains, forces the swamp muck sideways, creating a vacuum that sucks the fill downward. This was helped by having the fill built considerably above grade so as to get as much load over

WELL RIG *(below)* used to put down blast holes through filled material.



LOADING *(above)* one of the holes with charge of explosives let down through pipe casing.

ARMY PILEDRIVER *(below)* sinking 2-in. pipe casing during first stages of experimental work.

by Blasting

Department Handles Holes in Swamps

A TRENCH was shot along the center line of one highway route before any fill was placed.

the shot as possible. In the sand fills the surface of the fills after being shot showed hardly any crater and the sand seemed to drop right down into the shot hole completely filling it, but in the clay dumps, there was a much more decided crater in evidence after the shot, showing that some of the force of the explosion worked upward and escaped, by blowing a hole upwards through the dump. Besides, the material clung together and did not drop down following the shot like the sand did.

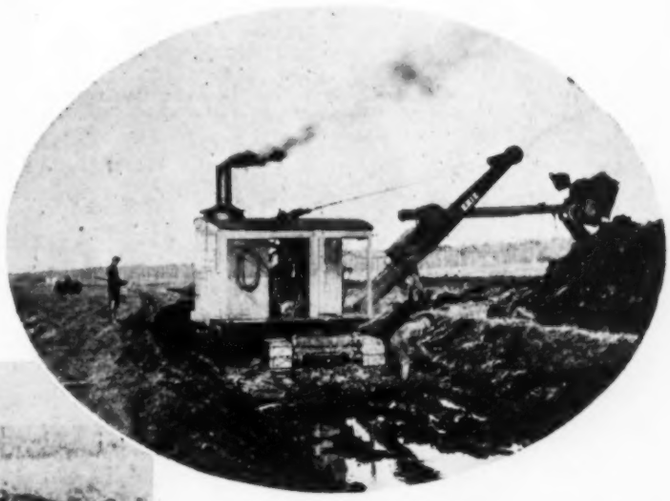
Following the shooting along the center line of the fill, additional holes were shot 5 ft. inside the shoulder line.

Trouble with keeping the holes open with the post augurs led to their replacement by a tripod-mounted army piledriver rigged with a heavy oak block having a ¾-in. rod 3 ft. long screwed into its bottom as a guide in driving 2-in. pipe closed at the lower end by a pointed wooden plug. When the pipe reached hard bottom, it was raised slightly, the plug was removed and a springing shot set off. The hole was then loaded with from one to three boxes of 40 per cent gelatin and shot.

A later revision of practice employed a churn drill to clear material from the pipe casing which was driven without a plug in its lower end. More recent plans involve the use of 4 or 5-in. casing and a long tin container for the explosives.

At one of the swamps the method followed was to shoot a trench along the center line before placing any fill, exploding a long string of shots simultaneously. This formed a trench 5 to 6 ft. deep and 20 ft. wide. When the fill was placed later, it went almost to the bottom, eliminating subsequent blasting except along the shoulder line. This resulted in a considerable saving both in labor and powder.

"We have used about 7 tons of powder," Mr. White reports, "in placing 45,000 cu.yd. of filling material. Besides being cheaper than having to send another outfit on a job to raise sinkholes perhaps several times over a period of several years, we are assured that the fill is solid enough to place concrete on almost at once, thus giving us a great saving in time."

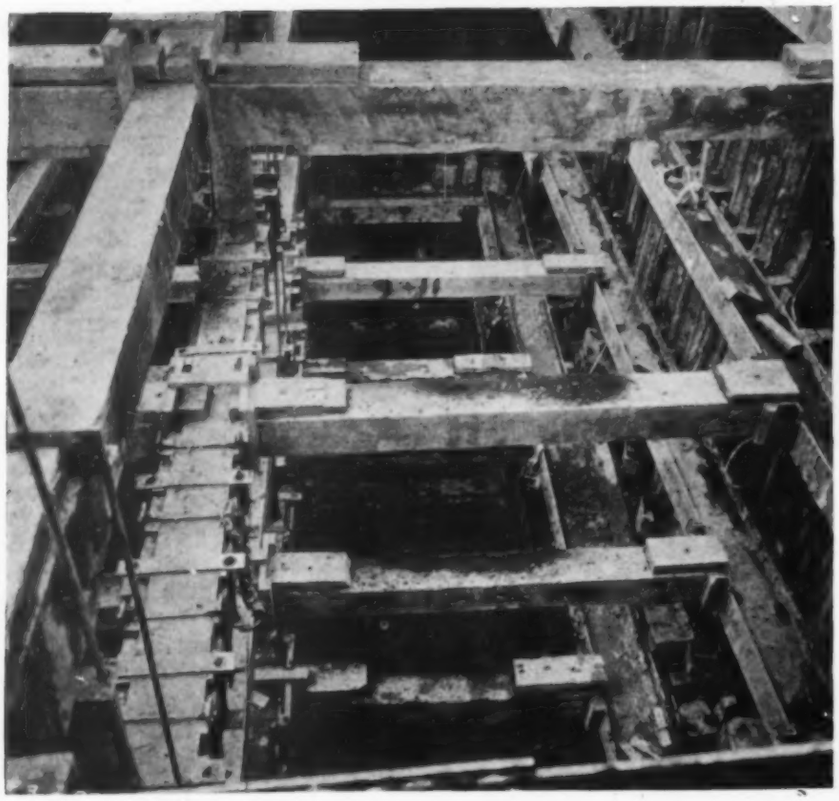


POWER SHOVEL (*right*) casting up material to form the highway subgrade.

AFTER FIRING, the surface of the dump sinks to the level of the swamp surface with a solid core down to hard bottom.

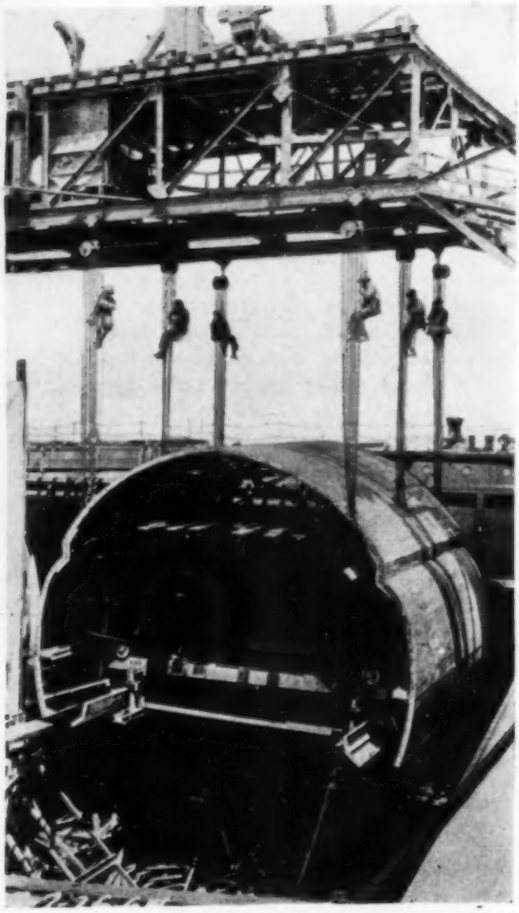
Getting Down to DETAILS

Close-up Shots of Job Methods and Equipment



HEAVY BRACING for excavation of coal-unloading pit 42 ft. wide, 82 ft. long and 35 ft. deep at the new Delray power house of the Detroit Edison Company. Soft blue clay and proximity of another power house necessitated unusually heavy bracing, including two rows of steel sheet piling.

Photograph from D. G. Morrison, Construction Superintendent of the Detroit Edison Company.



FORM HANDLING RIG placing one of the big top sections of the Oakland Estuary Subway recently completed between Oakland and Alameda, Calif. The California Bridge & Tunnel Company of San Francisco was the contractor.

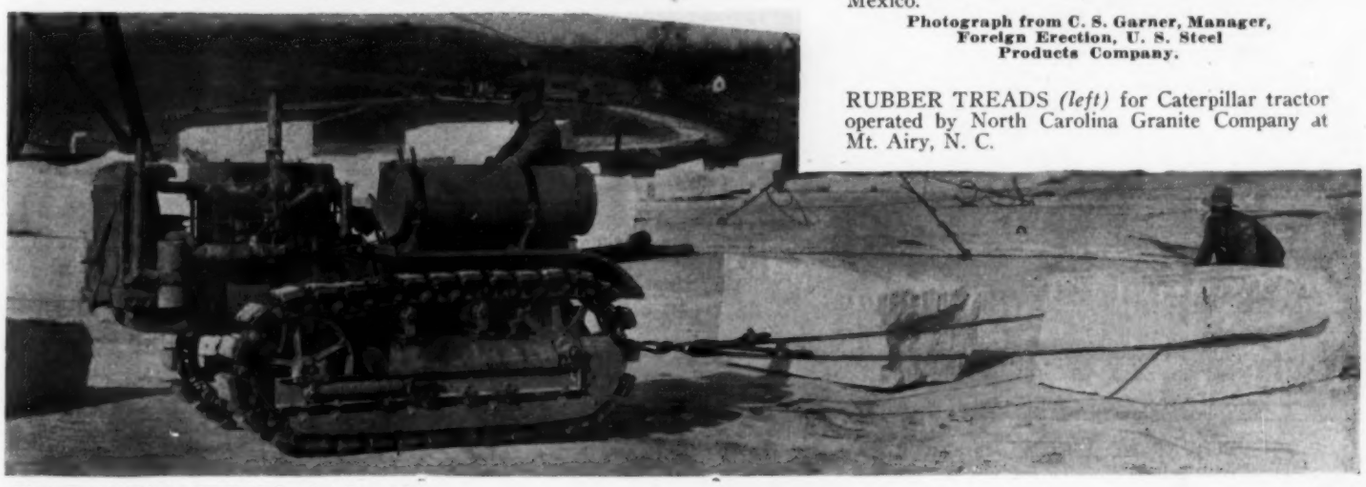
FLOATING TIMBER FRAMEWORK *(below)* divided into 9x9-ft. squares enables the U.G.I. Contracting Company to place stone revetment in proper quantities under water at Ohio River Dam No. 47, Newburgh, Ind. Frame is anchored in proper location and required amount of stone deposited in each square.

STUMP-PULLER, *(above)* consisting of a McCormick-Deering tractor coupled to a hoist by a universal joint. Used by the Consolidated Development & Engineering Company of Jacksonville, Fla.

CHUTING TOWER on Smith paving mixer pours concrete at new Buffalo, N. Y., dock built by the Monarch Engineering Company of that city.

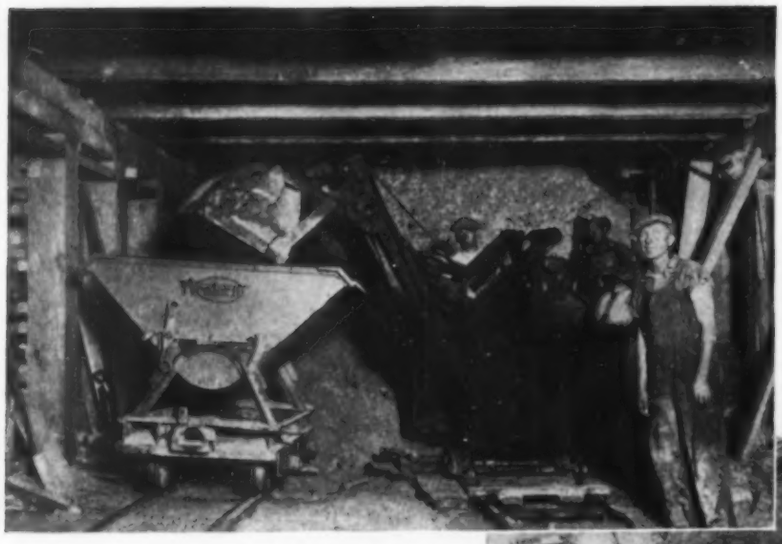
CABLE AND TROLLEY RIG delivers material for high towers of Salsipuedes railroad viaduct in Mexico.

Photograph from C. S. Garner, Manager, Foreign Erection, U. S. Steel Products Company.

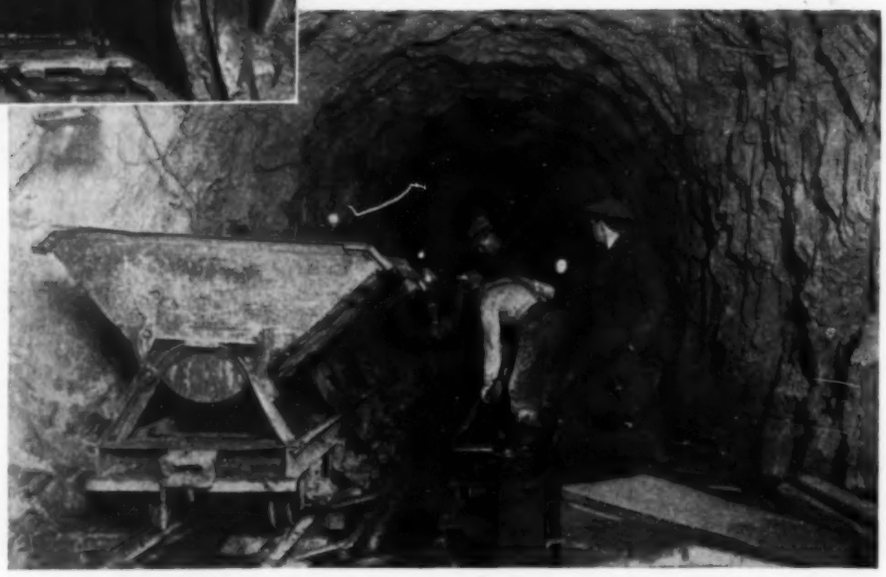


RUBBER TREADS *(left)* for Caterpillar tractor operated by North Carolina Granite Company at Mt. Airy, N. C.

TUNNEL *for the Chelan Power Project*



MUCKING the bench in soft ground with a Butler air shovel loading into Western car.



FORM SETTING preparatory to pouring the concrete curbs forming part of the tunnel lining.

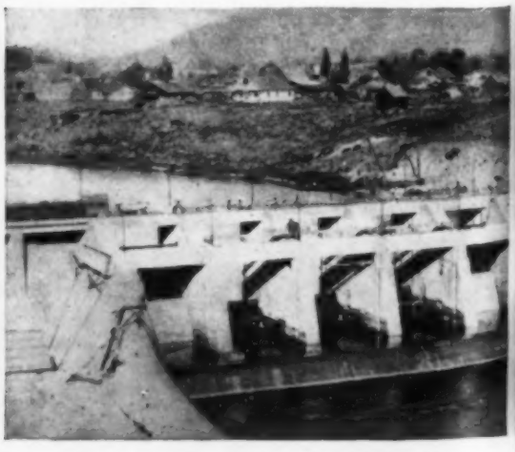
THE Chelan River, which is less than 4 miles in length and which drops 400 ft. in its short journey from Lake Chelan to the Columbia River, is being developed to deliver 130,000 hp. to a hydro-electric plant in central Washington. The Chelan Electric Company, a subsidiary of the Washington Water Power Company, is in charge of the development and Grant Smith & Company of Spokane is the contractor.

Three features of this development are completed: the concrete dam across the valley of the Chelan River; the power house which now contains one vertical unit capable of developing 32,300 hp., and which later will be equipped to provide a total of 130,000 hp.; and a pressure tunnel, 11,680 ft. long with an inside diameter of 14 ft.

Tunnel Excavation—The most difficult part of the job was the driving of the tunnel, which was preceded by the sinking of two shafts and the driving of two adits. The tunnel was driven from the intake end from shaft No. 1, and adit No. 1. The penstock tunnel was excavated from the power house end, a scraper being used to remove the muck on this section. A second shaft and a second adit were driven further along the line as the tunnel was advanced.

Excavation was pushed at the in-

POWER-HOUSE PIT excavation showing penstock openings in rock side-wall.



DAM, on foundation of gravel and boulders,

AND DAM

Grant Smith & Company Use Extensive Plant for Rock and Concrete Work

LOADING ROCK from the tunnel bench with the aid of a Conway mucker electrically operated.

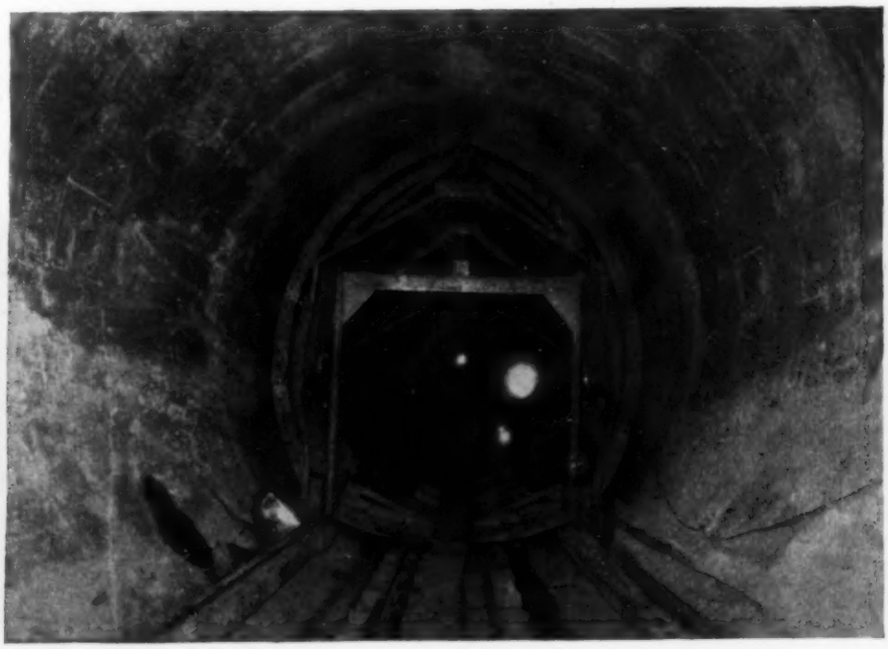
DRILLING for the bench was done with drifters mounted on a horizontal column.

take end in order to start the concreting, which was taken care of by three concrete plants, one at the dam, one at adit No. 1 and one at the power house. Compressor stations were located at the same points. Five headings were driven simultaneously. Ingersoll-Rand drifters were used in two of these, Denver Rock Drill-Waugh machines in two, and Chicago Pneumatic drills in one. The first section of the tunnel at the intake end was driven through cemented sand, gravel and clay; the rest of it was mostly in granite. In the earth section, the heading was mucked by hand and the bench by machine. Rock headings were one round ahead of the bench. Heading and bench generally were shot at the same time.

Muck and concrete in the tunnel were hauled by gas locomotives in Western cars equipped with V-bodies and roller bearings. Four Butler air shovels and two electric Conway mucking machines were used in getting out the muck. There were 300 ft. of Blaw-Knox traveling steel arch forms on the job. Concrete around these was placed with three Ransome ½-yd. guns. The tunnel lining was poured in four sections: curbs, the portion of the invert outside the curbs, arch, and last, between the curbs.

Surge Tank—A steel surge tank 45 ft. in diameter and 103 ft. high was

has slab base 300 ft. wide; it is 63 ft. high.



FOR LINING the tunnel 300 lin.ft. of traveling steel forms were used. Concrete was placed pneumatically.

EXCAVATION (*above*) for power-house foundation was handled by a 4-yd. Bucyrus dragline loading into hoppers feeding 4-yd. Western cars.

included in the construction. The 1,000 ft. of steel-lined tunnel below the surge tank varied in diameter from 14 ft. at the top to 12 ft. 6 in. at the bottom, where it divided into two 9-ft. penstocks 113 ft. long leading to the Johnson valves at the power house. A Bagley scraper with double hoist excavated 60,000 cu.yd. of loose material at the surge tank site. The method of excavating the shaft is apparent in one of the photographs.

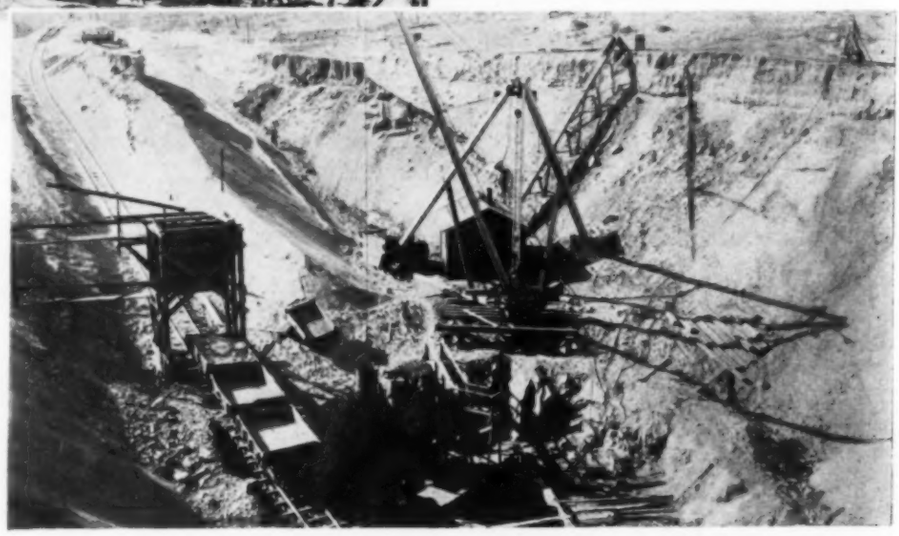
The dam is 63 ft. in height from bottom of cut-off trench to crest. Because it was built on a foundation of gravel and boulders, it has a slab base 300 ft. wide. It contains, with the intake, 25,000 cu.yd. of concrete.

Power House—A 4-yd. Bucyrus dragline was the principal factor in the excavation of 300,000 cu.yd. for the power house foundation and tail race. Material at the power house was dumped in a hopper and thence into Western 4-yd. cars illustrated below.

Grant Smith and Company had four camps on the work, all carefully planned and well-equipped. The bunk houses had hot and cold water and shower baths. Two men were assigned to a room, and—worthy of remark—linen was changed twice a week.

All operations were under the supervision of V. H. Greisser, chief engineer, Washington Water Power Co., Spokane, Wash. A. J. Turner was supervising engineer, with H. A. Moran as assistant on dam construction. T. H. Judd was resident engineer. H. H. Hunt, vice-president and general manager, was in charge for Grant Smith and Company. George Putnam was general superintendent. Superintendents on sections of the work were Charles Lundeen, power house excavation; V. G. Hindmarsh, tunnel, and William Taylor, concrete.

SURGE TANK EXCAVATION equipment included stiff-leg derrick, bucket, hopper and cable-operated cars.



EQUIPMENT INVENTORY

At Dam

P & H ¾-yd. gas shovel
Western dump cars
Plymouth 7-ton dinkey
Plymouth 3½-ton friction drive
Smith 1-yd. tilting mixer
Blaw-Knox inundator
Butler hoppers
American hoist

Tunnel

2 4-ton Plymouth locomotives
4 7-ton Whitcombs (gas)
Western cars with V bodies
4 air-driven Butler mucking machines
2 electrically-driven Conway mucking machines
Ingersoll-Rand drifters
Denver Rock Drill - Waugh rock drills
Chicago Pneumatic rock drills
300 ft. of Blaw-Knox steel forms
3½-yd. Ransome concrete guns

Gravel Plant No. 1

Telsmith crusher
Telsmith screens, conveyors, etc.
Lidgerwood hoist

Gravel Plant No. 2

Telsmith screens and sand settling tank

Hoisting Engines

15 American

Power House

Bucyrus ¾-yd. shovel
Bucyrus 4-yd. dragline
3 Porter 18-ton dinkeys
48 Western 4-yd. cars
Exeter 20-ton locomotive crane.

Derricks

1 Clyde
3 Lambert
3 American

Concrete Mixers

1-yd. Smith at dam and power house
¾-yd. Smith at surge tank
1-yd. Rex at adit No. 1

Compressor Plants

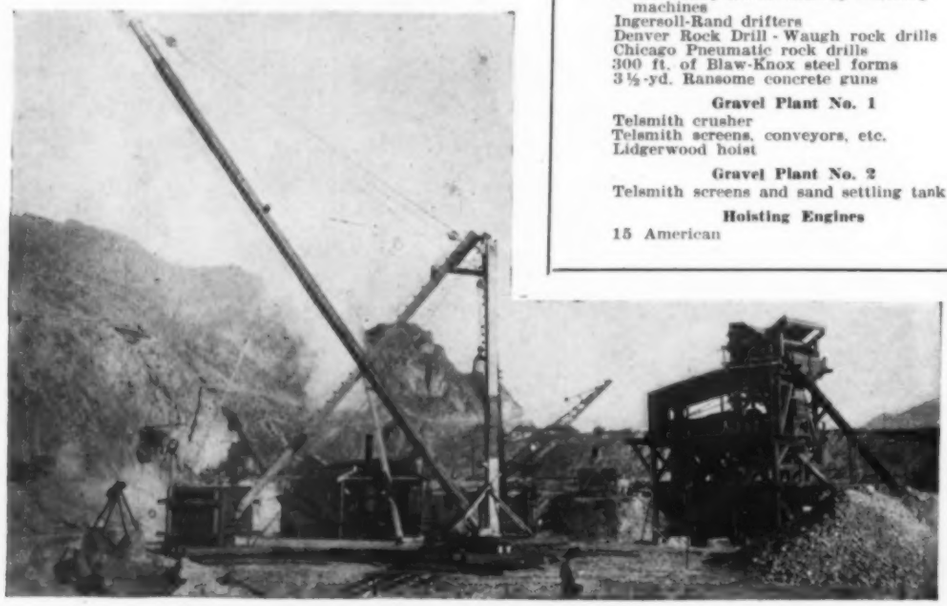
Power house:
Chicago Pneumatic 1500 c.f.m.
Ingersoll-Rand 900 c.f.m.
Adit No. 1:
2 Ingersoll-Rand (1200 and 900 c.f.m.)
Dam:
2 Ingersoll-Rand (1200 and 900 c.f.m.)

Drill Sharpeners

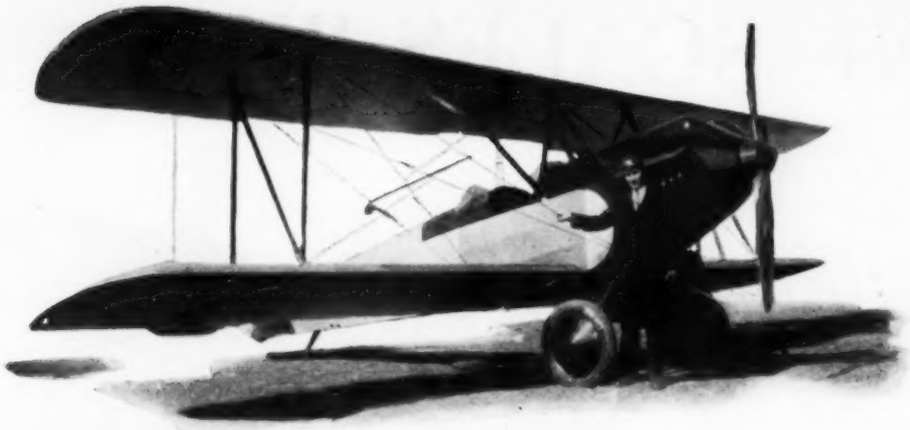
1 Ingersoll-Rand No. 50
3 Denver Rock Drills - Waugh No. 8

Tractors

3 10-ton Caterpillars



SAND AND GRAVEL PLANT serving the construction of the power house for the Chelan project.



AIR TRANSPORT *for the Contractor*

By George E. Johnson
Manager, Economical Bridge Association, Lincoln, Neb., and Topeka, Kan.

I LEARNED to fly at a regular flying school and early last year began using a plane in my business, looking after bridge construction in Iowa, Nebraska, Kansas and Oklahoma. For a few trips I took an experienced pilot with me, as it was necessary to select new landing fields at each stop and I felt that I should have the assistance of an experienced cross-country flyer until I became accustomed to this type of flying.

An airplane, I have found, is as practical as an automobile. When my stops are only 25 or 30 miles apart I do not save much time. My average stops, however, are from 100 to 150 miles apart and I find that I can get around to my work in from one-fourth to one-third of the time that it formerly required with an automobile. Our railroads are so located in this part of the United States that it is very difficult to get north and south and for that reason rail transportation with me is out of the question.

Air Transport Costs—The cost, including depreciation and operation, on a two-place plane is 3½c. a mile; on a three-place plane, 5c. a mile; and on a four-place plane, 6c. a mile. If a pilot is to be employed, that cost should be added to the above figures. These costs are derived from my experience of traveling more than 60,000 miles using different types of planes. As my boys are running a flying school I have had an opportunity to test several different makes of planes and in addition to my own costs I have checked up the costs of operations at the school.

Last year there were only two half-days that the weather stopped me from traveling. This year there have been parts of four days that I have been held up by bad weather. We have had very wet weather this season and I have made several trips in a plane when I could not have gone to my work over unimproved roads in an automobile. That is one of the advantages of an airplane. As soon as a storm is over you can travel, as the roads are clear, while in this section of the United States automobile travel is very difficult off the main highways for a considerable time after a rain.

In performing his duties as manager of the Economical Bridge Association of Lincoln, Neb., and Topeka, Kan., George E. Johnson has made extensive use of air transport to keep in touch with bridge construction jobs. To date he has made business trips, by air, aggregating 60,000 miles. *Construction Methods* asked Mr. Johnson for his views on air transport as an aid in the regular business activities of the construction man. His reply appears herewith.—Editor.

Recommendations

To any contractor buying a plane to use for everyday work I would recommend that he purchase a plane that has an approved type certificate from the United States Department of Commerce.

The plane, including the load that the contractor wishes to carry, should not weigh more than 15 lb. per horsepower. This will insure ample power to get out of small fields and a sufficient amount of power to pull through stormy weather.

The buyer should make certain that the plane is equipped with a motor that has been on the market long enough to prove its reliability and the motor should be equipped with dual ignition.

The motor should also be equipped with either a metal or micarta propeller, as flying through a rain will ruin a wooden propeller in one or two trips.

Oversized tires are a great benefit in landing in fields other than established airports. Wheel brakes are generally an extra, but they are well worth their cost.

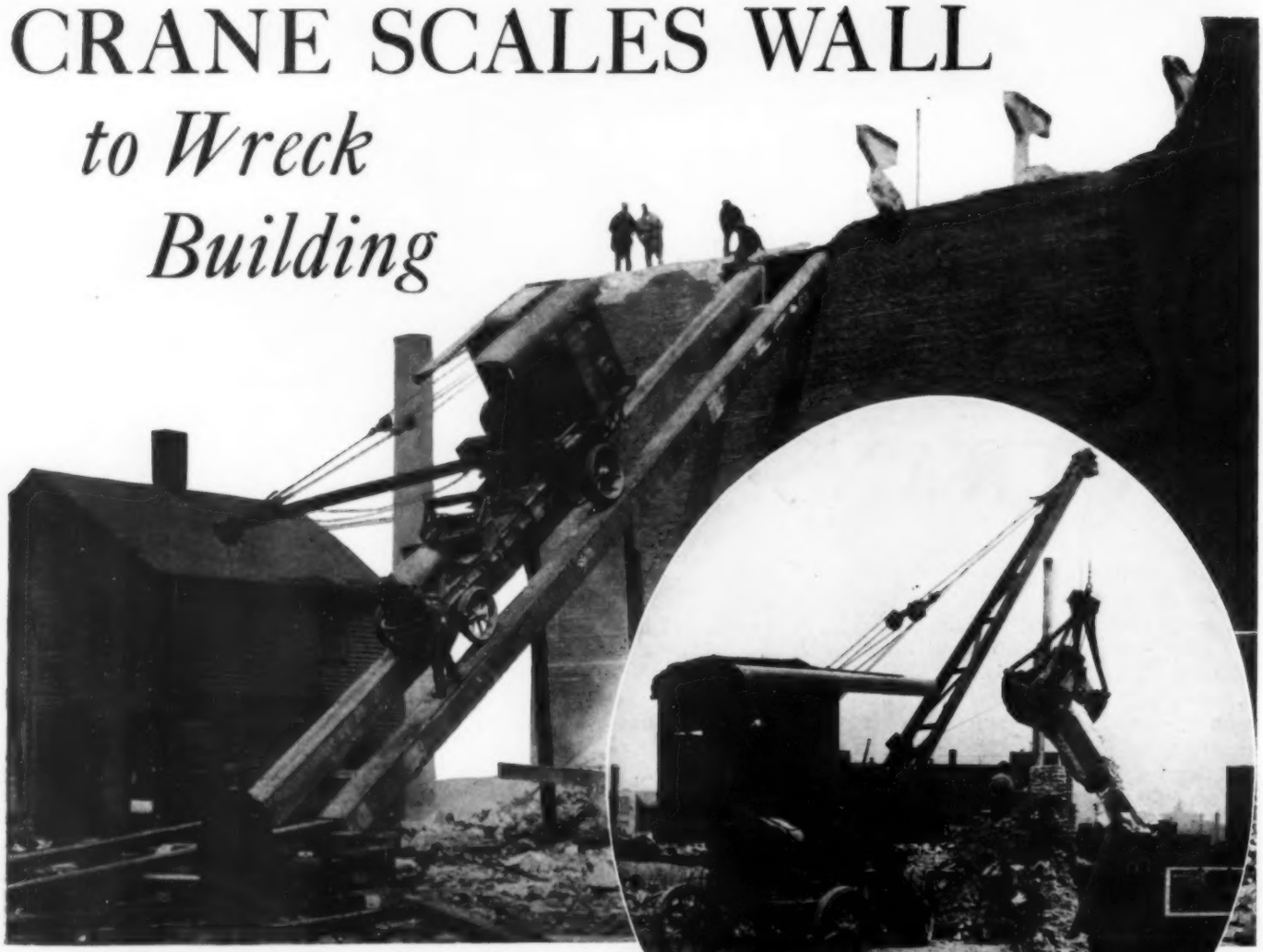
No plane should be used for cross-country flying that cannot be safely landed and taken off from a tract 80 rods square, as any plane may at some time have a forced landing and if a pilot will fly high enough so that he will have a good gliding angle he can always find an emergency field 80 rods square to get into.

One of the most important things to consider is the extra instruments—instruments in addition to those required by the United States Department of Commerce. There are four extra instruments that are necessary for cross-country flying in heavy weather and floating clouds; without these instruments the pilot will take chances that are very dangerous. These instruments are: First, a reliable compass. Second, an air speed indicator. Third, a turn and bank indicator. Fourth, a clock with a second hand.

The question of an inclosed or open plane and of a monoplane or biplane is simply a question of taste.

It is my opinion that any contractor who has a considerable amount of traveling to do will find it economical and desirable to use a plane in his business, as I have found that the time saved with the use of an airplane enables me to handle double the amount of business that I formerly handled. Woods Brothers Construction Company, of Lincoln, Neb., has recently purchased a six-passenger cabin plane to use in its business of construction work.

CRANE SCALES WALL *to Wreck Building*



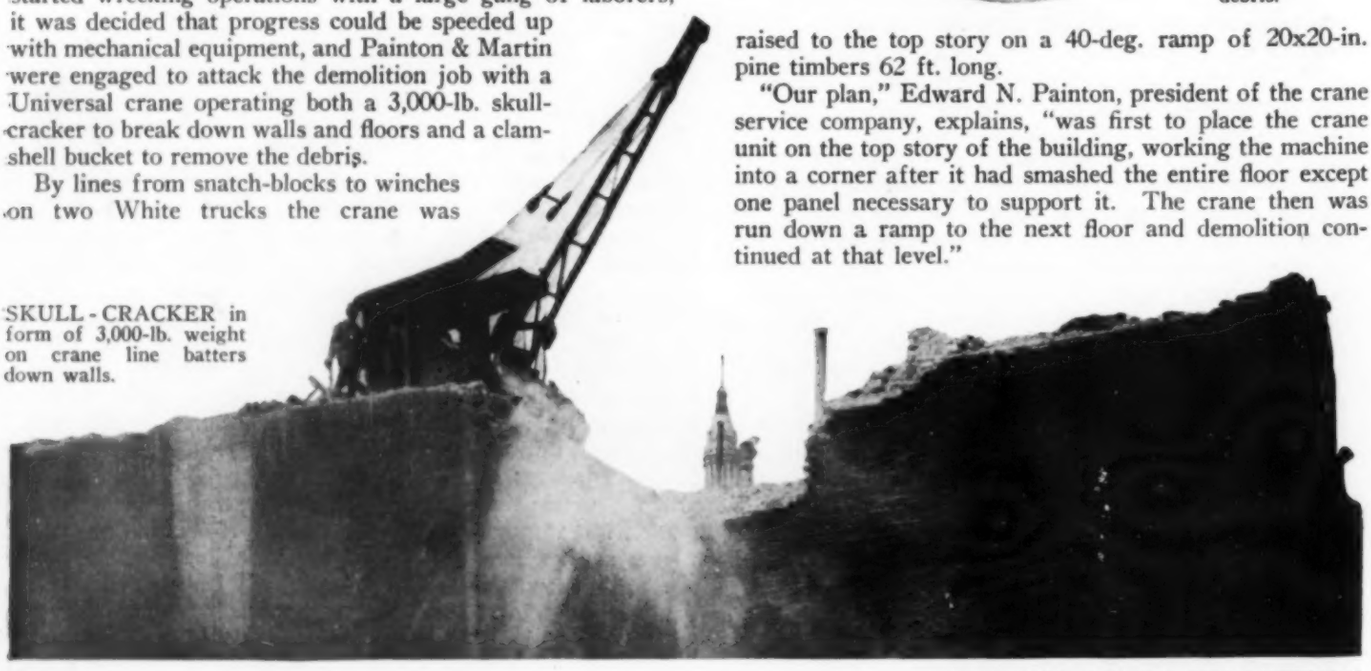
TRUCK WINCH LINES pull crane up 40-deg. ramp of 20x20-in. timbers.

CLAMSHELL bucket speeds removal of debris.

TO MAKE way for the new Union Terminal in Cleveland the Armour building, a reinforced concrete structure four stories high in front and six stories in the rear, had to be demolished. After C. Lurie & Company started wrecking operations with a large gang of laborers, it was decided that progress could be speeded up with mechanical equipment, and Painton & Martin were engaged to attack the demolition job with a Universal crane operating both a 3,000-lb. skull-cracker to break down walls and floors and a clamshell bucket to remove the debris.

By lines from snatch-blocks to winches on two White trucks the crane was raised to the top story on a 40-deg. ramp of 20x20-in. pine timbers 62 ft. long.

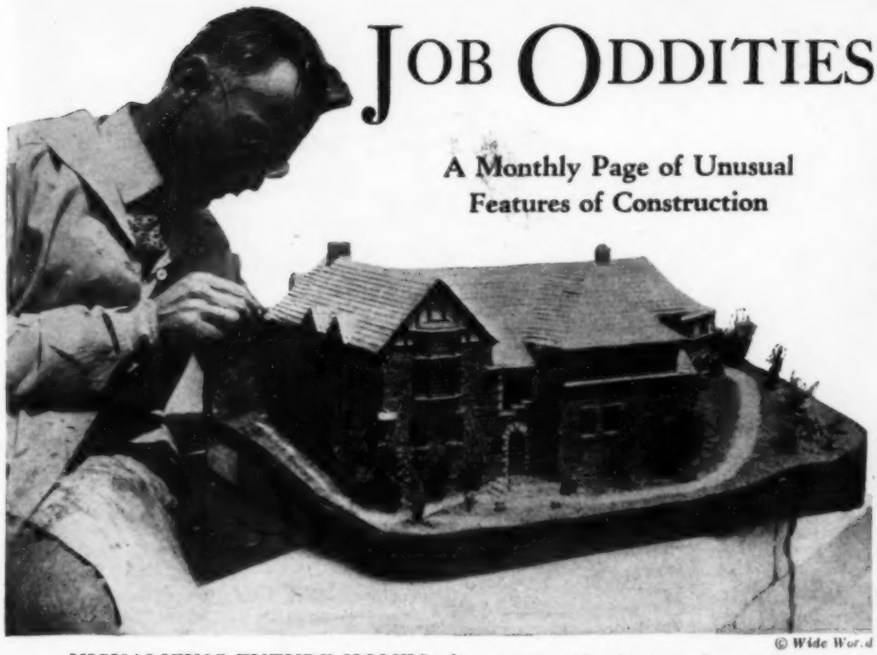
"Our plan," Edward N. Painton, president of the crane service company, explains, "was first to place the crane unit on the top story of the building, working the machine into a corner after it had smashed the entire floor except one panel necessary to support it. The crane then was run down a ramp to the next floor and demolition continued at that level."



SKULL-CRACKER in form of 3,000-lb. weight on crane line batters down walls.

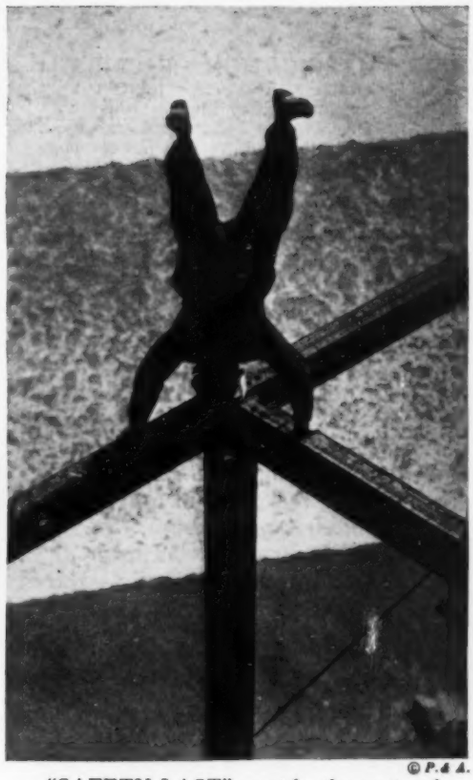
JOB ODDITIES

A Monthly Page of Unusual Features of Construction



© Wide World

VISUALIZING FUTURE HOMES often saves costly changes after construction of the actual building has begun. Karl Suchomel, miniature artist of Los Angeles, is putting the finishing touches to a model of a home which is to be built for E. E. Rodgers in Hollywood, Calif.



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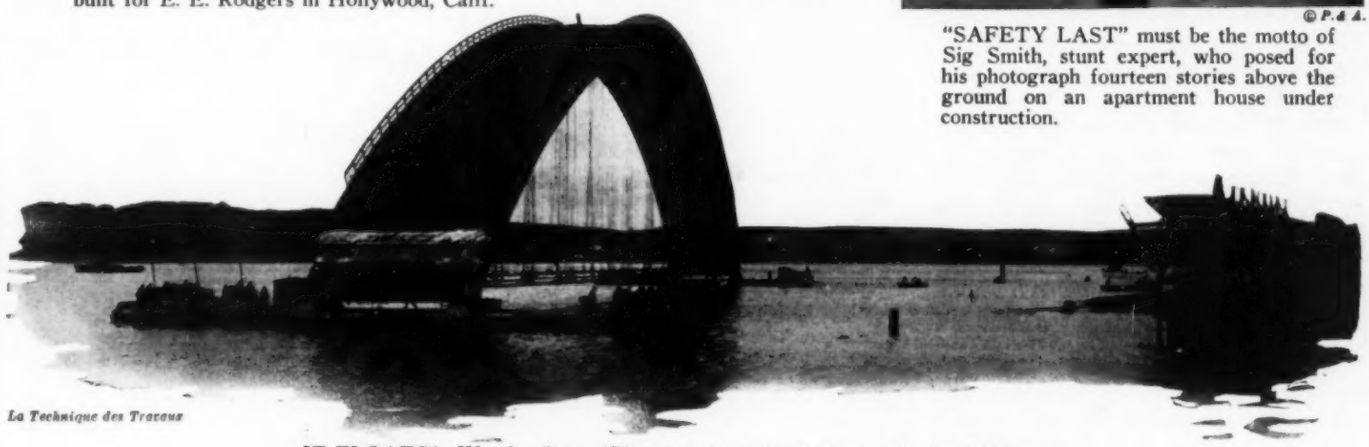
"SAFETY LAST" must be the motto of Sig Smith, stunt expert, who posed for his photograph fourteen stories above the ground on an apartment house under construction.

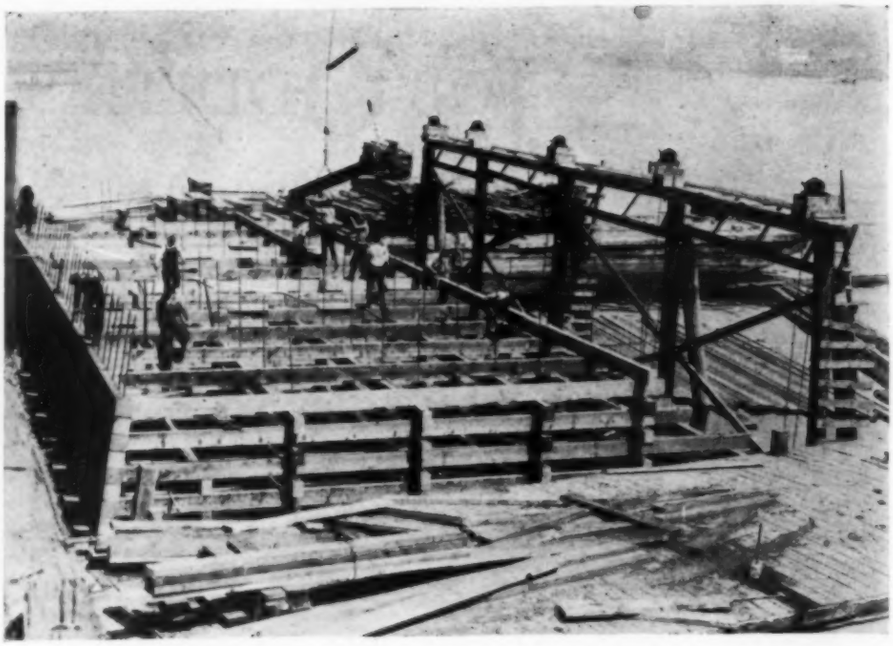


La Technique des Travaux

IT FLOATS! Wooden form, 170 meters long, for the first arch of an 800-meter bridge which is to connect Brest with Plougastel, France, was built on shore, then loaded onto two boats for transportation to the piers on which it rests. It weighed 600 tons. Two more forms are to be handled in like manner.

ASSISTING THE LANDSCAPE GARDNER. In its spare moments this Universal crane picks up cocoanut palms and carries them to other locations for replanting. It belongs to the W. A. Dickinson Transfer Company of Miami, Fla.

VISIBLE MEANS OF SUPPORT for his forms were provided by this contractor in a locality where lumber was plentiful. No danger of these forms buckling when concrete pouring starts.



FABRICATION OF CRIBS in cradle at dock. All joints cut by machine. Continuous rods with sleeve nuts and washers used. Crib lowered by winches as constructed.

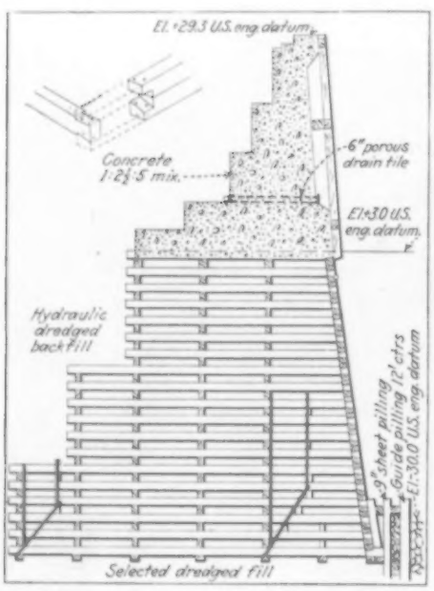
MORTISED JOINTS
Wall and Sewer for

FIFTY timber cribs, 100 ft. long, 37 ft. high and 44 ft. wide at the base, framed so accurately that the mortise and tenon joints have been described as "cabinet work," form the sub-aqueous foundation for the new concrete bulkhead wall for the west side of the Willamette River waterfront of Portland, Oregon. Behind this wall is being constructed 5,000 ft. of reinforced concrete intercepting sewer, designed to eliminate the periodic flooding of basements in the business and warehouse district. Harbor wall and sewer are to be completed by Jan. 1, 1929, and will cost about $2,135,000.

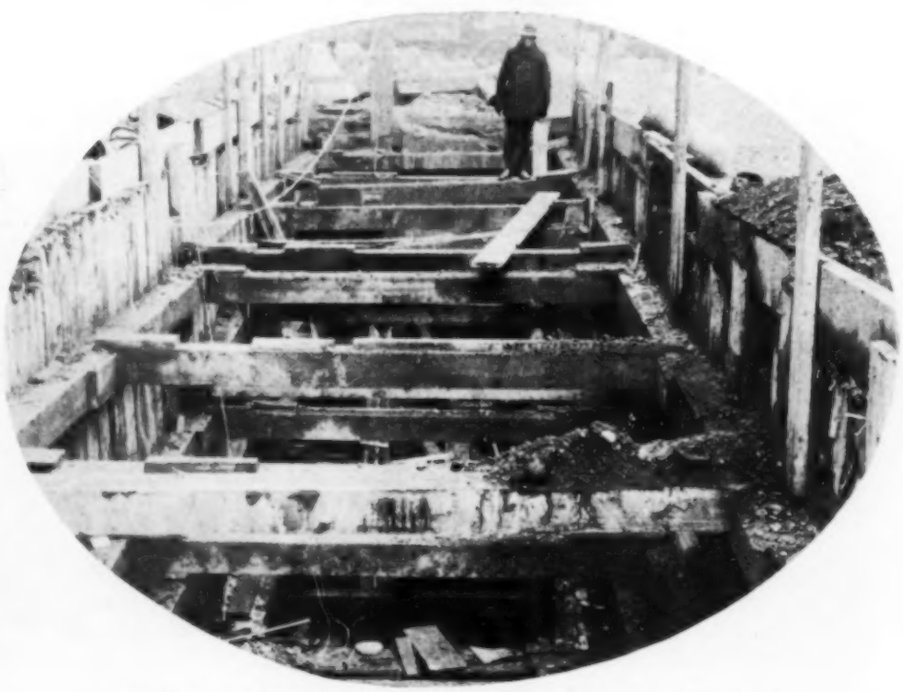
The timber cribbing of the below-water bulkhead is rockfilled, and on it rests the concrete bulkhead wall backfilled with crushed rock and gravel. Eventually an esplanade, 25 ft. wide, will be constructed along the top of this wall.

Machine-Cut Tenons—The most interesting part of the work from the point of view of the contractor is the construction of the cribbing. This work was sublet by the general contractor, the J. F. Shea Co. of Portland, to the Pacific Bridge Company, of Portland. Douglas fir timbers, 12x12 in. and 12x8 in., were floated from the mill to a crib-building plant on the Willamette River. Here they were picked from the water by crane, and carried by conveyors to the point where each was accurately marked for every hole and joint. A special planer, supplied by the T. A. Fay & Egan Company of Cincinnati, Ohio, then cut the tenons; holes were bored for the tie rods, and the dimensions checked by inspectors.

The cribs were built on a cradle. Cable slings were employed to hold them together while the successive layers of heavy timbers were set in place and the joints fitted. Each crib contains 220,000 ft., b.m., of lumber and is bolted together with metal tie-rods and plates. Concerning the workmanship of these cribs, C. W. Staniford, of New York, one of the consulting engineers, remarked, "The making of the cribs had to be first-class work, but the contractor is doing it like cabinet work." In full-sized laboratory tests sample joints stood



DETAILS of timber crib and concrete bulkhead wall.



SEWER CONSTRUCTION where soil made tunneling impossible. Tongue-and-groove sheet piling was driven down on each side of the ditch to hold back quicksand.

SINKING FOUNDATION CRIB to position with aid of winches. When properly aligned and keyed to the next crib, it is rock-filled.

ON BULKHEAD CRIBS

Portland Waterfront

pulls of from 90,000 to 110,000 lb. before failure.

The river bottom was prepared by dredging or filling to grade. Two rows of guide piles helped align the cribs accurately. A row of 9-in. sheet piling was sunk a few inches outside the river edge of the base of the cribs. Filler blocks were bolted between the crib timbers and the piling to prevent movement of the filling material, and each crib was bolted to its neighbor in a manner that makes disturbance of the alignment practically impossible.

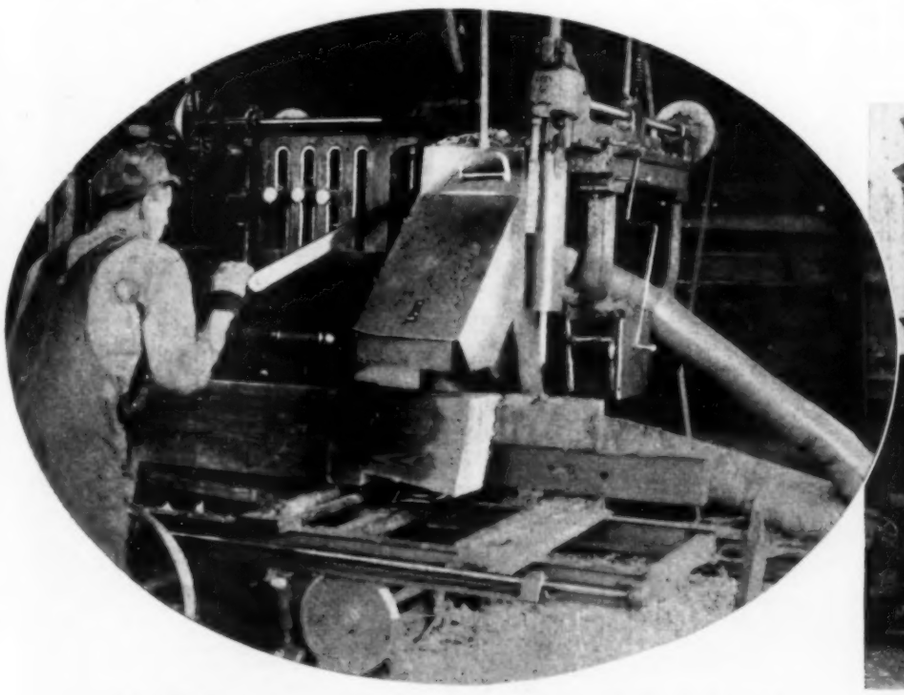
In those instances where the river bottom had to be filled to the bottom of the cribs, measured skips of rip-rap were dumped to cover the bottom evenly. This work was done with extreme care, and it proved unnecessary to employ divers in order to inspect it.

When all the cribs were in place, the concrete bulkhead wall sections were begun. The concrete wall is 24 ft. wide at the bottom, and tapers upwards to an elevation about 30.0 ft. above the low water mark, where it is 5 ft. wide. The face of the concrete is protected by timber fenders 12x12 in., set on 8-ft. centers.

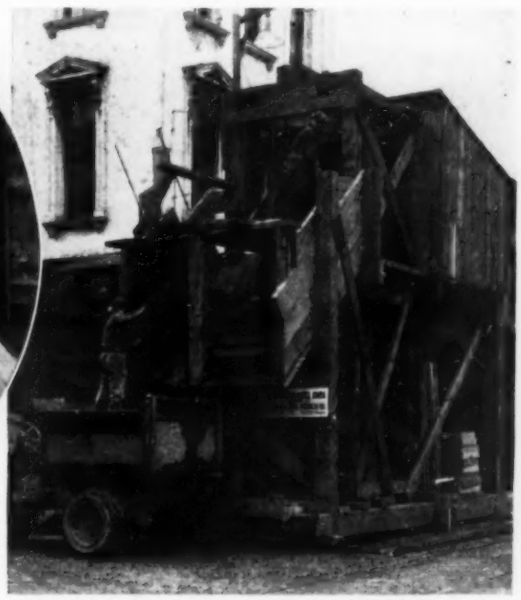
Usual tunneling methods were employed in constructing the intersecting sewer. In only one spot was quicksand encountered. This necessitated opening the sewer excavation to the surface and driving sheet-piling.

Under normal conditions the sewer will empty directly into the river. During high water a 110,000-gal. pumping plant, constructed by the Jaggar-Sroufe Company of Portland, will handle the flow. The equipment consists of three 30,000-gal. American Well Works non-clog sewage pumps with 30-in. intakes, and two 10,000-gal. Fairbanks-Morse wood trash pumps with 20-in. intakes.

The whole work was planned and its construction is under the direction of O. Laurgaard, city engineer of Portland. Consulting engineers called in on the project were James H. Polhemus, chief engineer and manager of the Port of Portland; C. W. Staniford, consulting engineer, New York; M. M. O'Shaugnessy, city engineer of San Francisco; and D. C. Henney and J. C. Stevens, consulting engineers, Portland.



PLANER used for cutting tenon joints. Different knives were used for cutting bevel slopes and square joints. All crib timbers were framed with this machine.



SMALL TRUCKS removed excavated material from sewer tunnel. Elevator hoists spoil from tunnel to bins.

NEW EQUIPMENT ON THE JOB

No Trouble to Prime This Pump

A portable pump which can be primed automatically in less than a minute, even in freezing weather, has been designed by the American Steam Pump Company of Battle Creek,

Mich., for use in drainage work, road building, irrigation and general construction. The primer receives its suction from the engine intake manifold. Pumping capacities are from 50 to 1,200 gal. per minute against heads of from 10 to 50 ft.

A Larger Shovel for Heavier Work

The Osgood Company of Marion, Ohio, has placed on the market a new Victor gasoline shovel designed for greater capacity and heavier work than its other models. It will carry a 22 or

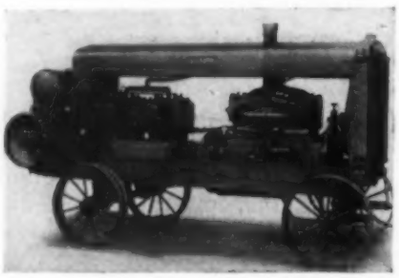
24-ft. boom, a 15 or 16-ft. handle and a 1½ or 1¼-yd. dipper, depending on the material to be excavated and the job to be done.

The Victor may be had as shovel, dragline, back-hoe, crane or clamshell, and in any or all combinations. In preparing it for any class of service no additions or changes are necessary except the attaching and reeving up of the proper boom assemblies and buckets.

All of the Osgood construction features have been retained in the new shovel, such as the combination cast-iron gasoline tank and counterweight, the large-sized motor equipped with a storage battery and the electric starter.

Another Model Added to Compressor Line

A new 4-cylinder vertical type compressor has recently been added to the line of these machines manufactured by Schramm, Inc., of Westchester, Pa. This compressor, for both port-



able and stationary installation, has a bore and stroke of 7⅛x5 and a displacement of 360 cu.ft. per minute when operated at 780 r.p.m. A heavy-duty Buda engine with a bore and stroke of 6x7⅛ supplies the power.

The compressor embodies all of the features found in the regular line of Schramm portable units, including air strainers on the compressor and engine, visible gasoline strainer, and an automatic slow-down governor which immediately reduces the speed of the engine when the air compressor reaches a predetermined pressure or when the load is automatically thrown off the compressor. The machine also is equipped with a clutch which enables the operator to start his engine independent of the compressor.

Medium-Size Paver for Medium-Size Jobs

A 13-E paver particularly adapted to city paving, alleys, smaller country roads, sewer work and other jobs requiring a portable, medium-size mixer is the latest product of the Ransome

Concrete Machinery Company of Dunellen, N. J. This paver has all the features of the larger units. Power is furnished by a 4-cylinder, 30-hp. gasoline engine.

Asphalt Emulsion Cures Concrete Roads

An asphalt emulsion called "Curcrete" is being manufactured by the Barber Asphalt Company, of Philadelphia, for the purpose of curing concrete. It is applied to freshly finished concrete in the form of a fine spray and unlike other methods of

curing, such as ponding, puddling or hay curing, it requires no further attention by the contractor or inspector after its application.

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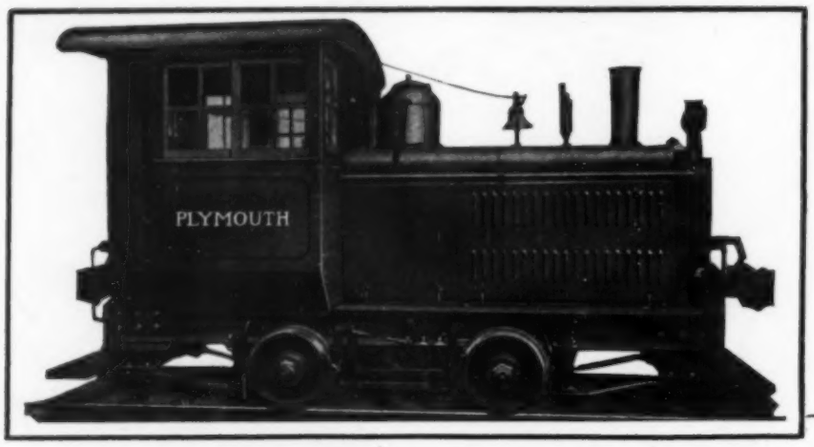
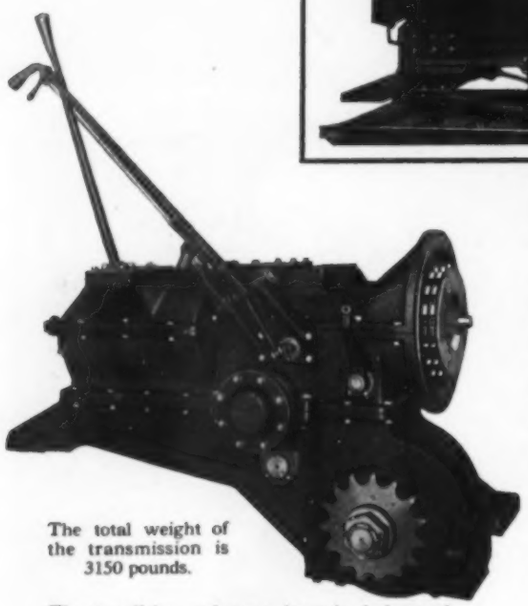


Our one dominant purpose is to keep building the best Gasoline and Diesel Locomotives in the world.



The total weight of the transmission is 3150 pounds.

The simplicity and ruggedness in design and construction are very evident.

All Plymouth transmissions give four speeds and equal power and speeds in either direction. All bearings enclosed and run in oil. All shafts carried on ball bearings. All gears alloy steel and heat treated. Driving sprockets in same plane with driven sprockets. Oil tight case. Fool-proof reverse arrangement.

THE FIFTEEN TON PLYMOUTH GASOLINE LOCOMOTIVE meets the demand for a medium heavy locomotive.

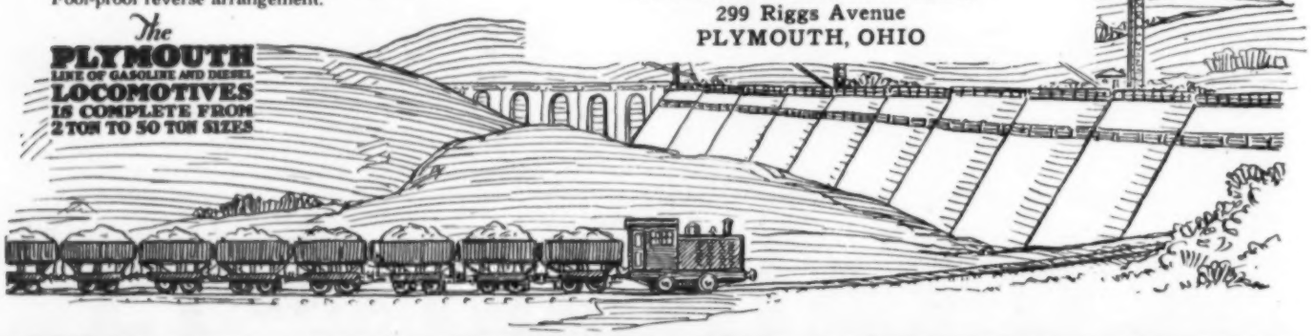
This medium weight makes it especially adaptable for work requiring portable tracks and on jobs where a heavier locomotive can not be used—Quarries, sand, gravel and clay pits, mines, logging operations and railroad construction, grading or fill work, and for plantations.

Having ample power to handle ten or more loaded standard railway cars, this model makes an excellent switching engine and for standard gauge hauling. The fifteen ton is also made for narrow gauges, both Gasoline and Diesel powered.

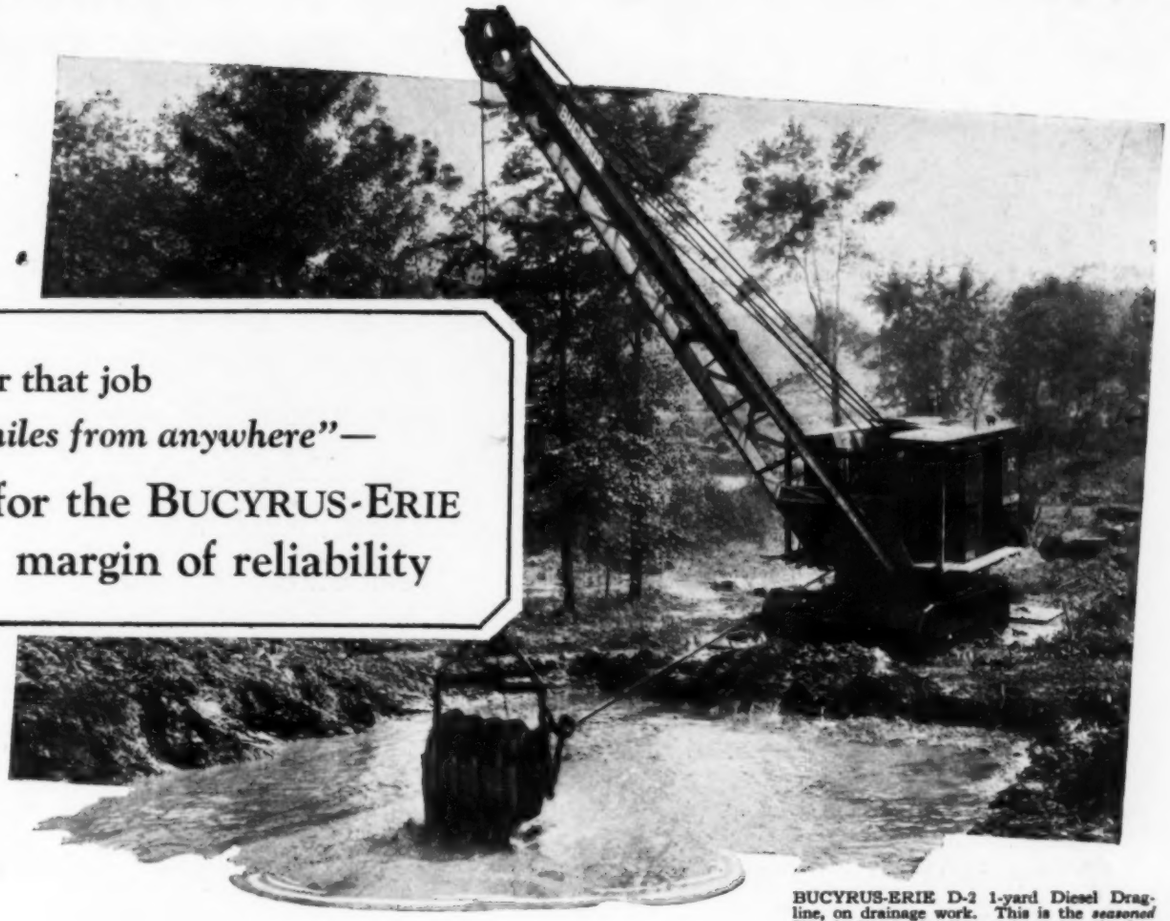
Write for descriptive literature and installation data. We build them from two ton to fifty ton sizes, all typically Plymouth in stamina and long life,

PLYMOUTH LOCOMOTIVE WORKS
The Fate-Root-Heath Company
299 Riggs Avenue
PLYMOUTH, OHIO

The PLYMOUTH LINE OF GASOLINE AND DIESEL LOCOMOTIVES IS COMPLETE FROM 2 TON TO 50 TON SIZES



PLYMOUTH
Gasoline and Diesel Locomotives



For that job
"miles from anywhere"—
for the BUCYRUS-ERIE
margin of reliability

BUCYRUS-ERIE D-2 1-yard Diesel Dragline, on drainage work. This is the *seasoned* Diesel shovel, dragline and crane—the first Diesel machine in the field, fully developed by years of successful experience behind it.

WHEN you "plant" one of those drainage or irrigation jobs that's miles from the nearest repair shop, or source of fuel, get the Reliable BUCYRUS-ERIE Diesel and make sure of larger and steadier profits.

You can depend on a constant output from this Diesel, that has unequalled experience behind it—developed from the first Diesel Shovel built.

Owners are so well pleased with the work of their BUCYRUS-ERIE Diesels, that they set these machines up as standards of efficiency. For instance, an owner of 2 BUCYRUS-ERIE Diesels writes:

> "We are delighted with the performance, and are convinced that if we handle our work as efficiently as the BUCYRUS-ERIE Diesels do their part, we will make plenty of money." (Name on request.)

Write us for some reports from owners using BUCYRUS-ERIE Diesels on work similar to your own.

And Make Big Savings in Fuel Cost—75% to 90% with this Diesel

Owners report that a 1-yard BUCYRUS-ERIE Diesel uses only 12 to 15 gallons of fuel oil per shift—cheap fuel that costs only ⅓ to ¼ as much as gasoline.

And it's an easy machine to take care of—no ignition system to fuss with, no spark plugs or electrical apparatus of any kind. Starts right off—from stone cold to full power in twenty seconds.

BUCYRUS-ERIE COMPANY

Plants: South Milwaukee, Wis.; Erie, Pa.; Evansville, Ind.

General Sales Offices: South Milwaukee, Wis., and Erie, Pa.

BRANCH OFFICES:

Boston	Atlanta	Buffalo	St. Louis
New York	Birmingham	Detroit	Dallas
Philadelphia	Pittsburgh	Chicago	San Francisco

Representatives throughout the U. S. A. and Canada

Offices and Agencies in all the principal countries throughout the world

BUCYRUS ERIE

Hercules Engines

Preferred by Mead-Morrison

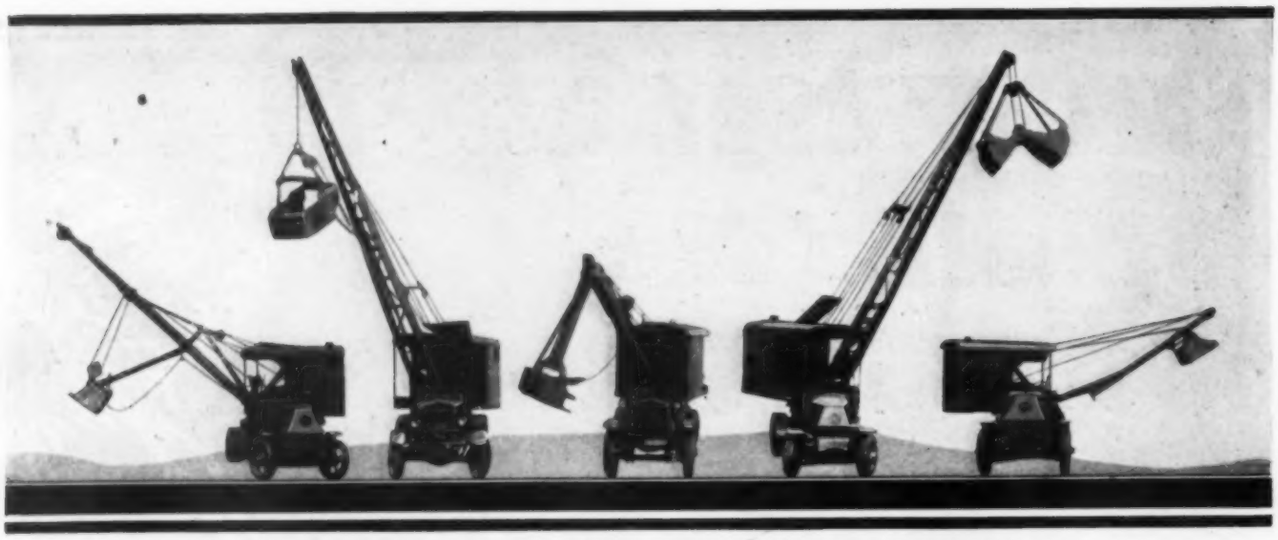
Here in a gravel pit near Thief River Falls, Minnesota, a Hercules-equipped Mead-Morrison ½ yard shovel is doing a splendid job day after day for H. P. Lund. This shovel is doing the kind of a job any owner needs done — the kind an owner is sure of when he buys his machinery Hercules-equipped. That a model "G" (4¾" x 5¾") Hercules Engine should have been chosen by this manufacturer of shovels reflects the confidence that equipment builders put in Hercules design, manufacture and performance.

HERCULES MOTORS CORPORATION

General Offices
Canton, Ohio, U. S. A.

West Coast Branch
Los Angeles, Calif.

The
Don't confuse the "feather-touch" clutch control with any other power clutch control—*there is no other device like it!*
Its sensitive action permits that feel of the load so valuable in the ticklish jobs like setting steel—no need to keep your hand on the operating lever—no danger of burning up the band and *the release is positive.*
The "feather-touch" clutch control means 25% greater output and is but one of many of the money-making Northwest features.
NORTHWEST ENGINEERING CO.
The world's largest exclusive builders of gasoline and electric powered shovels, cranes and draglines.
1723 Steger Building
28 E. Jackson Blvd.
Chicago, Illinois
U. S. A.
1/2
3/4
1 YD
1 1/4
NORTHWEST



SHOVEL — DRAGLINE — BACKDIGGER — CLAMSHELL — SKIMMERSCOOP

WHERE ELSE, except in Universal, will you find such a versatile, flexible unit, capable of being equipped with just the right attachment for any job—and combined with this versatility the unequalled mobility and flexibility of a motor truck mounting?

Ask for a copy of Folder 212-E, which shows 11 attachments for the Universal Crane, some one of which will fit your job in a money-making manner.

1929
CONVENTION &
ROAD SHOW
A.R.B.A.
JAN. 14 - 18
CLEVELAND, O

THE UNIVERSAL CRANE CO.
1309 E. 28th St. · · LORAIN, OHIO

UNIVERSAL

CRANES
SHOVELS
SKIMMERS
DRAGLINES
TRENCH HOES

LARGEST *and* ONLY EXCLUSIVE BUILDERS *of* TRUCK CRANES

Patent Flattened Strand

"HERCULES" RED-STRAND

REG. U.S. PAT. OFF.

WIRE ROPE

Offers You Better Wire Rope Results

Present day material handling equipment demands wire rope of great strength plus ability to bend and ability to wear.

The Patent Flattened Strand "HERCULES" (Red-Strand) Wire Rope is better able to meet the foregoing demands for the following reasons:

Strength: Size for size, this is the strongest wire rope made. This is due to two things: (1) The material used, which is rigidly tested to insure both strength and uniformity. (2) The construction, which permits the use of more metal.

Resistance to Crushing: On account of the small hemp core and the keystone shape of the strands, the Patent Flattened Strand construction offers maximum resistance to crushing. Each strand acts like a keystone in an arch.

Resistance to Wear: The Hercules quality also counts here, but another important factor is the construction. Note the number of wires in each strand over which wear is distributed.

Safety and Economy: The various features that make this wire rope extra strong and extra wear-resisting also make it safe, and as it lasts and lasts, it becomes more and more economical.

We particularly recommend Patent Flattened Strand "HERCULES" (Red-Strand) Wire Rope for use on heavy duty cranes, clamshell buckets, dredges, excavators and steam shovels. We shall be glad to have you write for further particulars.

If you are interested in fewer shut-downs, a larger daily output, less trouble and more actual value, we would like for you to write us for further particulars on this remarkable wire rope.

Made Only by **A. Leschen & Sons Rope Co.** *Established 1857*

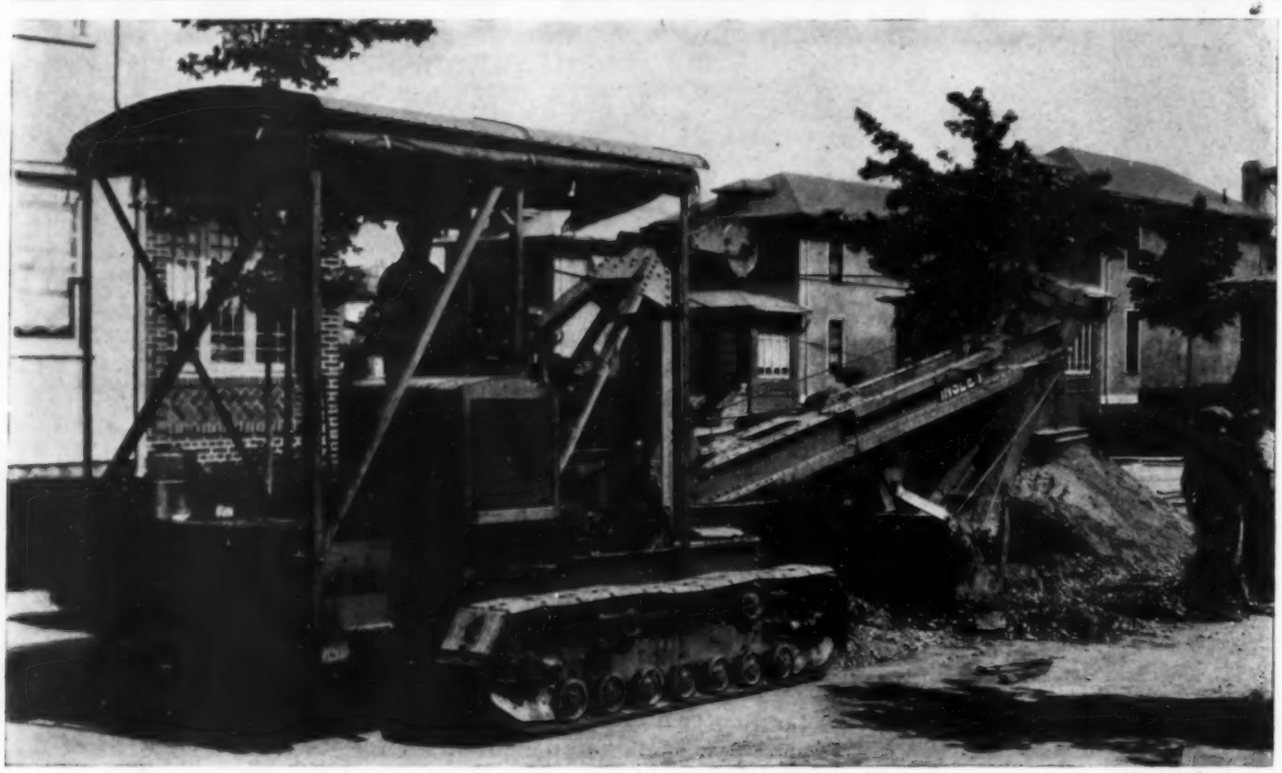
5909 Kennerly Avenue

ST. LOUIS

New York Chicago Denver San Francisco

INSLEY

SHOVEL–DITCHER–SKIMMER–DRAGLINE–CRANE



WHAT MR. STRUZZIERY THINKS OF THE INSLEY

"I have an Insley machine equipped with the Ditcher attachment only, as my work is entirely sewer and trench work. The machine is three years old this coming July and has worked nearly all the time, except for a few months through the winter.

"Most of my work has been in the city streets, digging trench for laying pipe. I am glad to say it is the most satisfactory piece of equipment I have ever used for this work. It will dig close to the pipe and leave only a little work to be done by hand. When we find boulders and ledge, it will dig these out with the teeth, where we could not use another machine.

"We have used the machine in all kinds of digging and have had few repairs. We are satisfied with it and will be glad to recommend it to anyone."

AFTER THREE YEARS

CHARLES STRUZZIERY is a sewer and water line contractor in Roslindale, Massachusetts. He has owned an Insley Ditcher for three years during which time it has been in practically continuous operation in city streets, digging trenches through clay, hardpan, boulder filled soil and ledge rock.

Three years is a long time for a piece of equipment to work, a long enough time, in fact, for it to fall to pieces, or else to convince its owner that it is good equipment. Therefore, when Mr. Struzziery says, "The machine is three years old . . . and it is the most satisfactory piece of equipment I have ever used for this work"—there is little more that need be said.

Mr. Struzziery is one of many Insley owners who have found that their machines have stood up under the hardest conditions, have delivered the goods and have made money for them, not only for a week, or a month, but year after year.

624

INSLEY MANUFACTURING COMPANY
INDIANAPOLIS ▲ *Engineers and Manufacturers*

making Bigger Profits *for owners everywhere*

IN practically every industry Monarch Tractors are making bigger profits for their owners. Their ability to provide the greatest drawbar horse power, their matchless strength, performance and economy of operation and their ability to meet all industrial, as well as dirt moving problems, has won them far and wide recognition as leaders in both the medium and heavy tractor field.

Lumbermen are enthusiastic over the Monarch "75" because of its economical and powerful performance on every job.

In the lumber camp its principal use is the moving of logs to the rivers and mills. Its tremendous horse power is also employed for operating complete saw mills, running high-lines, hoists, winches and loaders.

Write us about your power requirements. Let us show you how either the Monarch "50" or "75" can be a profitable, money returning investment in your business. Details will be sent gladly on request.

MONARCH TRACTORS CORPORATION
Subsidiary of Allis-Chalmers Mfg. Co.
SPRINGFIELD, ILL.

Seventy-five
$5350.00
Fifty
$3625.00
F. O. B.
Springfield, Ill.

Monarch Tractors

Estanco Del Tobaco — *Lima, Peru*

Government of Peru

The Foundation Company, General Contractor

Another of the many industrial projects, recently constructed by The Foundation Company in foreign countries, is the Estanco del Tabaco built for the Government of Peru, at Lima. The factory was built and equipment installed, in its entirety, by The Foundation Company.

THE FOUNDATION COMPANY

CITY OF NEW YORK

Office Buildings
Industrial Plants
Warehouses
Railroads and Terminals
Foundations and Underpinning
Filtration and Sewage Plants

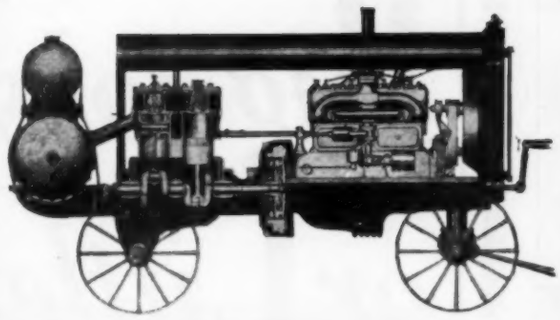
ATLANTA
PITTSBURGH
CHICAGO
SAN FRANCISCO

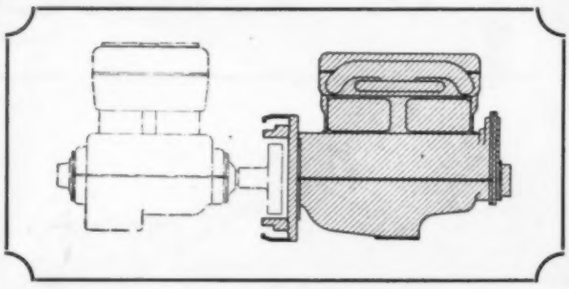
MONTREAL
MEXICO CITY
CARTAGENA, COLOMBIA
LIMA, PERU

LONDON, ENGLAND
PARIS, FRANCE
BRUSSELS, BELGIUM
TOKYO, JAPAN

Hydro-Electric Developments
Power Houses
Highways
River and Harbor Developments
Bridges and Bridge Piers
Mine Shafts and Tunnels

BUILDERS OF SUPERSTRUCTURES AS WELL AS SUBSTRUCTURES





Engine starts without compressor load!

Why Schramm is preferred

1. Operated by vertical-cylinder heavy duty Buda Engines.
2. Compressor parts are interchangeable.
3. Greater capacity per dollar invested.
4. Heavy-duty self aligning Clutch.
5. Engine starts without compressor load.
6. Visible Gasoline Strainer.

WHEN you crank the ordinary Portable Compressor engine with the solid coupling, both engine and compressor must be turned over in starting. Think of the effort required—especially in cold weather when the oil is stiff and hard.

No such starting trouble with the Schramm. Note the sketch above of the Schramm Clutch Coupling. You can start the Schramm engine separately, and get it warmed up for full load operation before taking the compressor or air load.

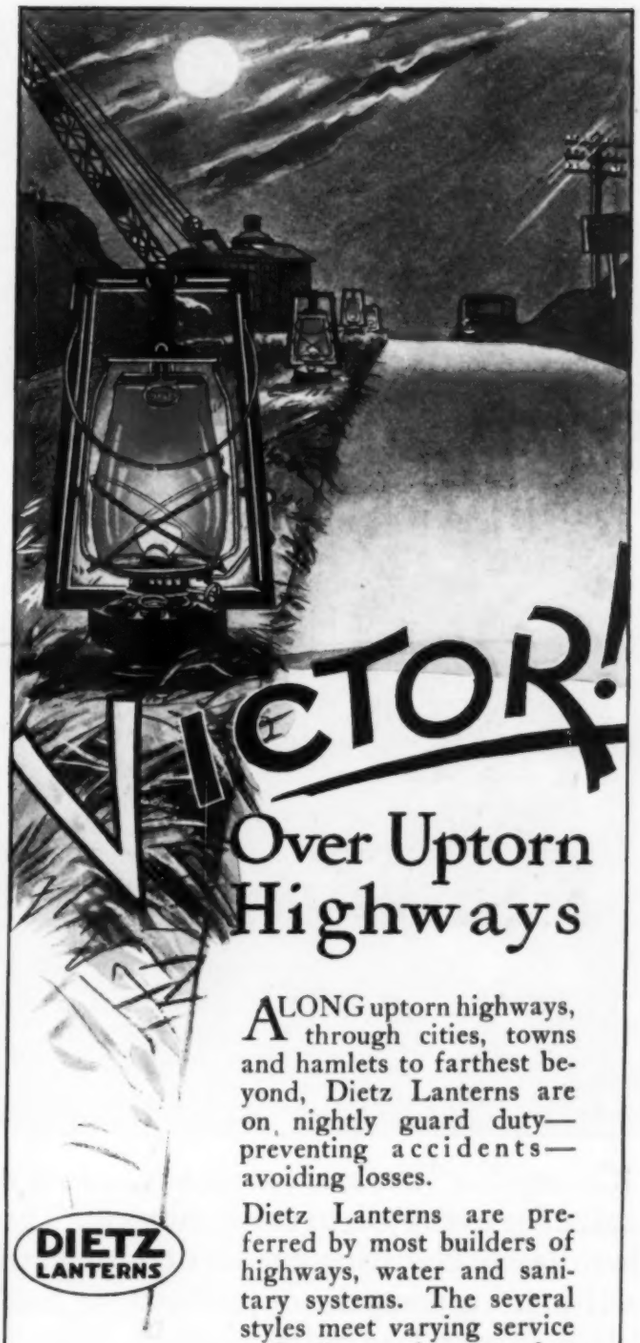
Look over the other features of the Schramm listed here and send for the 1928 Schramm Catalog.

SCHRAMM, INC.

West Chester, Pa.

Offices and Representatives in all Important Cities

Schramm



VICTOR!

Over Uptorn Highways

ALONG uptorn highways, through cities, towns and hamlets to farthest beyond, Dietz Lanterns are on nightly guard duty—preventing accidents—avoiding losses.

Dietz Lanterns are preferred by most builders of highways, water and sanitary systems. The several styles meet varying service and price requirements, but each has a reputation for dependability all its own.

We feature Dietz VICTOR Hot Blast Lantern in this advertisement. It is low priced, serviceable and popular.

DIETZ LANTERNS

R. E. DIETZ COMPANY

NEW YORK

Largest Makers of Lanterns in the World

FOUNDED 1840

Big jobs or Little

"Caterpillar" Tractors are made in four sizes—a size for every job of earth moving. The Sixty handles an elevating grader or a long string of self-loading scrapers, or pushes a big bulldozer blade. The 2-Ton pulls a rotary scraper, pushes a back-filler—works on the smaller tasks where nimbleness is the important thing.

Power—balanced with sure traction—these distinguish the "Caterpillar." Versatility, too, and the long life that comes from skilfully heat-treated steels.

CATERPILLAR

REG. U.S. PAT. OFF.

PRICES:

SIXTY	THIRTY	TWENTY
$4600	$2650	$2175

F.O.B. SAN LEANDRO OR PEORIA

2-TON
$1675
F.O.B. PEORIA

CATERPILLAR TRACTOR CO.

Executive Offices: San Leandro, California, U.S. A.
Sales Offices and Factories:
Peoria, Illinois San Leandro, California
Distributing Warehouse: Albany, N. Y.
New York Office: 50 Church Street
Successor to
BEST C. L. Best Tractor Co. The Holt Manufacturing Company HOLT

SERVICE
Mills and offices stretching across the country—service to you wherever your job may be! "Lehigh" means dependability.
LEHIGH PORTLAND CEMENT COMPANY
Allentown, Pa. New York, N. Y. Chicago, Ill. Birmingham, Ala. Spokane, Wash. Buffalo, N. Y. Boston, Mass. Philadelphia, Pa. Baltimore, Md. Richmond, Va. New Castle, Pa. Pittsburgh, Pa. Cleveland, O. Mason City, Ia. Kansas City, Mo. Minneapolis, Minn. Omaha, Neb.
LEHIGH
CEMENT

CLYDE

HOISTS CLYDE DERRICKS

All hoists used on the new General Motors laboratory being erected in Detroit by the Everett Winters Co., general contractors of that city, were built by Clyde. They consist of one three-drum steam, one two-drum steam, and three 80 H. P. two-drum gasoline outfits.

Wherever you find Clydes in use, satisfaction will prevail both among contractors and their operators. The former appreciate the low operating and upkeep costs; the latter praise the easy operation and the safety features found in every hoist of Clyde make.

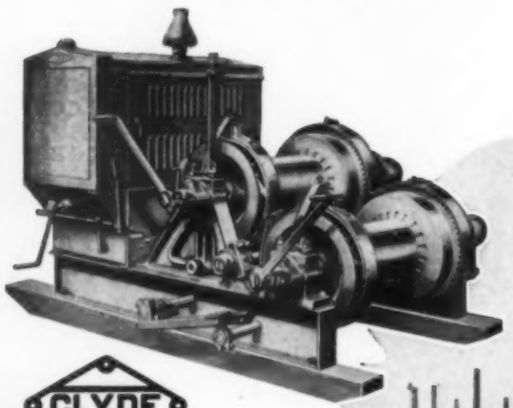
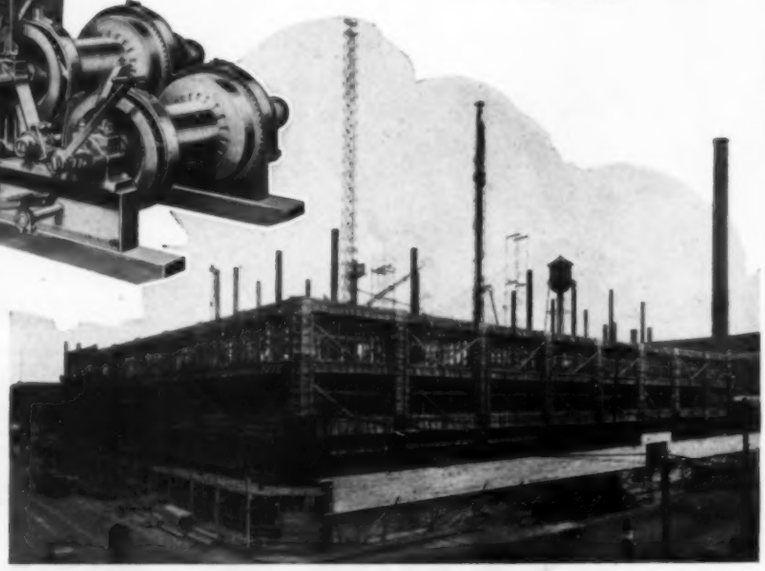


Illustration shows the new laboratory and the type of gasoline motor used



CLYDE

You'll take PRIDE in your CLYDE

CLYDE IRON WORKS SALES CO.

DISTRIBUTORS FOR CLYDE IRON WORKS DULUTH, MINNESOTA

— BRANCHES —

NEW ORLEANS:	309 MAGAZINE ST.	CHICAGO:	11 SOUTH LASALLE STREET
NEW YORK CITY:	856 EAST 136TH STREET	CINCINNATI:	201 W. PEARL ST
PORTLAND, OREGON:	555 THURMAN ST.	MEMPHIS:	69 UNION AVENUE
SEATTLE:	3410 FIRST AVENUE SOUTH	JACKSONVILLE, FLA.:	112 W. ADAMS ST
VANCOUVER, B. C.:	STANDARD BANK BLDG.	DALLAS:	508 REPUBLIC BANK BLDG
		OMAHA:	1003 FARNHAM ST.

CLYDE TWO MARKS OF GUARANTEED QUALITY

SUCCESSFUL PERFORMANCE FOR A.G.C. A.

You'll always *recognize General Wheelbarrows by their orange handles.*

a Modern Construction Tool

Specialized for a Special Job

IN most construction work the standard shape tray is regularly used. However, there are narrow places, sharp corners, and unusual jobs, where a special tray is needed that will pour accurately.

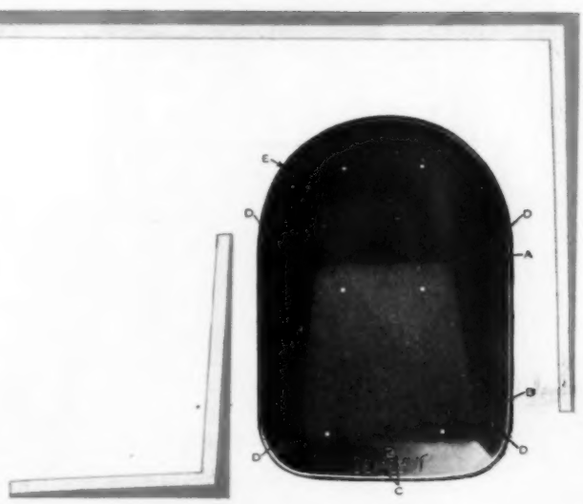
The General Measuring Tray takes care of such troublesome jobs. It is especially adapted to changing mixers and pouring concrete. The back and sides are vertical. The front is tapered almost to a point. The tray concentrates the flow of materials and places them exactly where you want them.

Like all General Products, the General Measuring Tray is guaranteed to give entire satisfaction to you. If it does not, it is replaceable without charge.

GENERAL WHEELBARROW COMPANY

Headquarters for Wheelbarrows, Concrete Carts, Steel Mortar Boxes, Scrapers, Salamanders.

3140 East 65th Street , **Cleveland, Ohio**



ALL General trays are cut and folded, having the advantage of full thickness throughout. They are formed cold without stretching or drawing of the metal, and the surface is smooth and rust-resisting. They are double lapped at the corners, and made tight by both riveting and welding. Note these features:

A Double lapped corners riveted and welded.

B Accurate spacing of bolts. Bolt holes are square and small, so as to fit bolt heads exactly, and keep them from turning. The punches that pierce these bolt holes are set in a solid die, and all holes are punched at one stroke of the machine. Absolute accuracy is thus assured.

C General name and catalog number embossed into metal at back of tray. This mark of identification doesn't wear off. No amount of exposure to weather can remove it.

D General trays are unconditionally guaranteed against opening up or coming apart.

E Edge reinforced by steel rod rolled into metal smooth and tight.

GENERAL AKRON

Send the coupon for General Wheelbarrow Handbook No. 107, which describes the General Measuring Tray and other features designed exclusively for the contractor field.

GENERAL WHEELBARROW COMPANY
3140 East 65th Street, Cleveland, Ohio

Send us General Wheelbarrow Handbook No. 107. Our equipment distributor's name and address are

_____

_____

Name _____

Company _____

Address _____

CM 10-28

LAKEWOOD CONCRETE MIXERS

Not a New Mixer

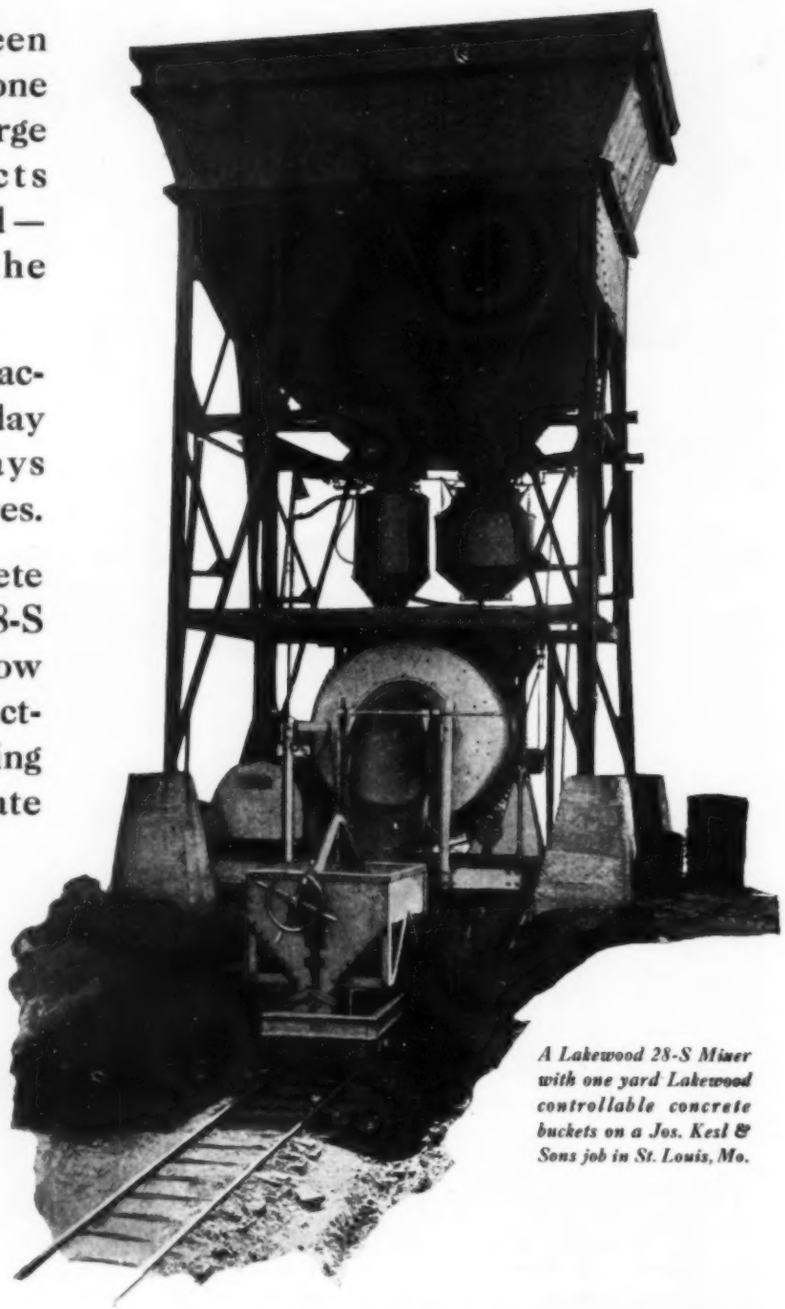
but one which has been constantly improved—one which has served on large construction projects throughout the world—that's the story of the Lakewood 28-S.

Speed of discharge, capacity, steady day in and day out service have always been outstanding features.

For the modern concrete plant the Lakewood 28-S appeals because of its low over all height—its compactness—its thorough mixing action—and its accurate water regulator.

Some Day You'll Buy a Lakewood

Send for Bulletin 20-R

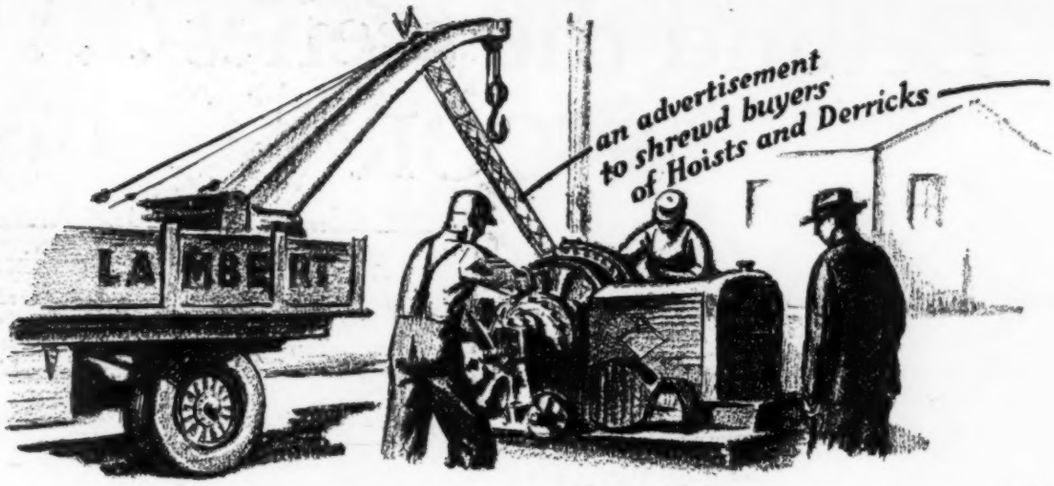


A Lakewood 28-S Mixer with one yard Lakewood controllable concrete buckets on a Jos. Kesl & Sons job in St. Louis, Mo.

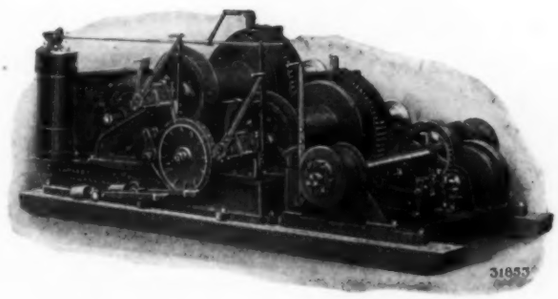
EXPORT OFFICES: 30 Church St., New York City - - *CABLE ADDRESS:* Brosites

LAKEWOOD

The Lakewood Engineering Co., CLEVELAND - O.



--- repairing another make of Hoist — is what I call service!



That's not infrequent out here at the Lambert plant. Not a few Lambert users who have some other makes of hoists as well depend upon us for repairs to the others. That's a regular part of Lambert Service. We charge no premium on such work and parts. The Lambert ideal is this—to assist Lambert users in *every way possible*. Sunday work is not unusual here at the plant. Our men are often on the job *during the night*.

We make (and service) hoists, derricks and cranes for all purposes. We make them with the Lambert name and reputation squarely behind them. Experienced engineers and contractors (shrewd buyers, all of them) know that this counts far more in the selection of equipment than any consideration of first cost.

LAMBERT

THE HOISTS EXPERIENCED CONTRACTORS BUY

The facts you want are at your fingertips

—facts on how well Lambert Equipment is made.

—facts that have influenced big, hard headed construction companies to select Lambert over "lower first cost" hoists, etc.

—facts on the *bigger resale value* of a Lambert Hoist, Crane or Derrick.

—the fact is, this coupon is the quickest way of getting these facts.....

LAMBERT HOISTING ENGINE CO.
117 Poinier St., Newark, N. J.

I am interested in dependable and economical hoists ☐ derricks ☐ cranes ☐ (Check one wanted.) Kindly send me information on the latest designs and show me how they will save me money.

Name.....

Address.....

Behind the scenes . . . "INCOR"

ALTERNATE layers of mud and rock presented an unusual problem in designing footings for the new Fox Theatre, New York City. Concrete made with "INCOR", the Perfected High-Early-Strength Portland Cement, made it possible to prevent side-slipping and at the same time remove the shoring in a matter of hours instead of days.

Concrete made with "INCOR" is ready to use in 24 hours. Yet it has the time-tested permanence of Portland Cement because it is a *perfected Portland Cement* in every sense of the term.

CONCRETE TESTS—"INCOR" CEMENT

Compression tests of 6 x 12-in. cylinders made in accordance with A. S. T. M. Standards.

Mix 1-4; water ratio .80 (6 gallons per sack of cement).

Aggregates; sand and pebbles from Long Island, New York.

Cured in moist room at 70° F.; tested damp.

Concrete was mixed in a 3-cu. ft. Wonder Mixer; 14 cylinders were molded from each batch; 2 from each batch were tested at each age.

Cement	Fineness	Concrete Batches	Slump in.	Flow	Concrete Strength lb. per sq. in.				
					1d	2d	3d	7d	28d
"Incor"	6.5	10	2¼	180	2230	3220	3630	4320	5340

The foregoing Concrete strengths are from a series of tests now in progress in our Research Laboratory under the direction of Professor Duff A. Abrams and are offered as indicating compression strengths that may be expected of concrete when "INCOR" cement is used.—August 1928.

SPECIFICATION FOR "INCOR" CEMENT

"INCOR" Cement is a perfected high-early-strength portland cement and is guaranteed to conform with all requirements of the Standard Specifications and Tests for Portland Cement of the United States Government and the American Society for Testing Materials. In addition, "INCOR" Cement is guaranteed to exceed the standard specifications in the following items.

Fineness: The residue on a standard 200 sieve shall not exceed 10% by weight.

Tensile Strength: The average tensile strength in pounds per square inch of not less than three standard mortar briquets composed of one part of cement and three parts of standard sand, by weight, shall be equal to or higher than the following:

Age at Test Hours	Storage of Briquets	Tensile Strength lb. per sq. in.
24	In molds in moist air for 24 Hr.	250
48	(1 day in moist air) (1 day in water)	350

The average tensile strength of standard mortar at 48 hours shall be higher than the strength at 24 hours.

"INCOR" Perfected High Early Strength PORTLAND CEMENT

Made and guaranteed by the Manufacturers of Lone Star Cement

International Cement Corporation
342 Madison Avenue New York

One of the world's largest cement producers—13 mills . . . total annual capacity 20,000,000 barrels

SUBSIDIARIES

ALABAMA PORTLAND CEMENT CO. Birmingham Alabama
INDIANA PORTLAND CEMENT CO. Indianapolis Indiana
THE CUBAN PORTLAND CEMENT CORP. Havana Cuba
LONE STAR CEMENT CO. OF PA. Philadelphia Pennsylvania
THE KANSAS PORTLAND CEMENT CO. Kansas City Missouri
VIRGINIA PORTLAND CEMENT CORP. Norfolk Virginia
KNICKERBOCKER PORTLAND CEMENT CO., Inc. Albany New York
LOUISIANA PORTLAND CEMENT CO. New Orleans Louisiana
ARGENTINE PORTLAND CEMENT CO. Buenos Aires Argentina
TEXAS PORTLAND CEMENT CO. Dallas and Houston Texas
URUGUAY PORTLAND CEMENT CO. Montevideo Uruguay

What better endorsement can you ask?

FOR SUCCESSFUL PERFORMANCE · A G C OF A ·

William P. McDonald, of Flushing, L. I., has bought his tenth MultiFoote.

Year after year this well-known A. G. C. contractor, who has just completed a 33 mile section of the Georgia Costal Road in 180 days, has used MultiFootes.

And he is but one of the many well known contractors among Multifoote repeat order buyers.

—what better endorsement of the Multi-Foote can you ask?

The Foote Company, Inc.
of Nunda, N. Y.
World's largest exclusive builders of road pavers

Frank E. Hall
152 W. 42nd Street
New York City

E. J. McHarg & Co.
31 Crestmont Rd.
Binghamton, New York

Wilcox Brothers, Inc.
588 Chenango Street
Binghamton, New York

MultiFoote Sales Co.
2811 West Fulton St.
Chicago, Ill.

Burton Franklin
Volunteer Building
Chattanooga, Tenn.

Edward R. Bacon Co.
Folsom at 17th Street
San Francisco, Calif.

CM10Gray

ACCEPT NO SUBSTITUTE

Sterling

—"rivet assembly" instead of bolts keep the legs rigid.

There should be more to a wheelbarrow than simply a tray, with a wheel, two legs and a couple of sticks hitched on. More than just any old perambulator made to sell cheap. There should be more—*and there is more*—you'll find it *only in a Sterling.* This one feature, shown here, will make you three times as much money in longer service and less repairs than you could ever save by buying any other barrow. *Why take a chance—others don't.*

Leading Hardware and Equipment dealers have Sterlings—or they can get them quickly from complete stock warehouses at Chicago, New York, Philadelphia, Pittsburgh, Cleveland, Detroit, St. Louis.

[— lower barrow cost per job—less repairs — longer life.]

STERLING ON A WHEELBARROW MEANS MORE THAN STERLING ON SILVER

STERLING WHEELBARROW COMPANY

Milwaukee Wisconsin

O.K. Keeps Air Tools WORKING

Thousands of users vouch for the steady service that these compressors give, day in, day out.

And the O.K. Air Compressor is powerful—a four-cylinder engine, with special device for idling when the load is cut off. There's a special O.K. Clutch for starting the engine separately. A new type radiator, special valves—and other advantages which we'll tell you about if you'll write.

Some valuable territory still open to agents.

O. K. CLUTCH and MACHINERY CO.

P. O. Box 305 Columbia, Pa.

FUNDOM SHOVELS

Make Profitable

Small and Average Size Jobs

A UNIQUE three-in-one design, unusual speed, low cost, big yardage and adaptability makes the Fundom a profitable buy for average size and small jobs.

Dipper capacity is 1/3 yard. The swing is full ¾ circle. Radius 16½ feet. The drive either gas or electric power.

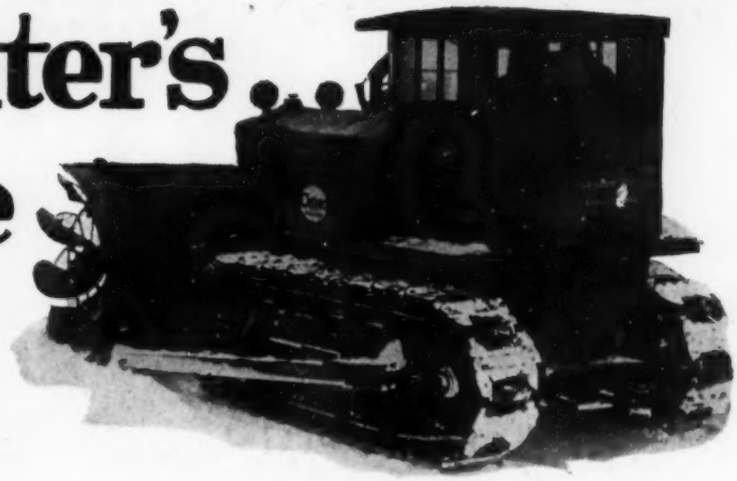
With Trench Hoe attachment for ditching, or Boom Extension for clamshell, dragline or crane work, the Fundom is unsurpassed as a versatile, economical digging machine.

Get the details and name of nearest dealer. Address—

The Fundom Hoist & Shovel Co.

407 American Bank Building, Lima, Ohio

Meet Winter's Challenge with Cletrac



WHEN heavy winter snows strike *this* year, be prepared with CLETRAC and modern, speedy snow-fighting equipment. Snow-choked roads and streets are a menace to life and property and a veritable blockade to trade and business. They must be dealt with QUICKLY when the need arises.

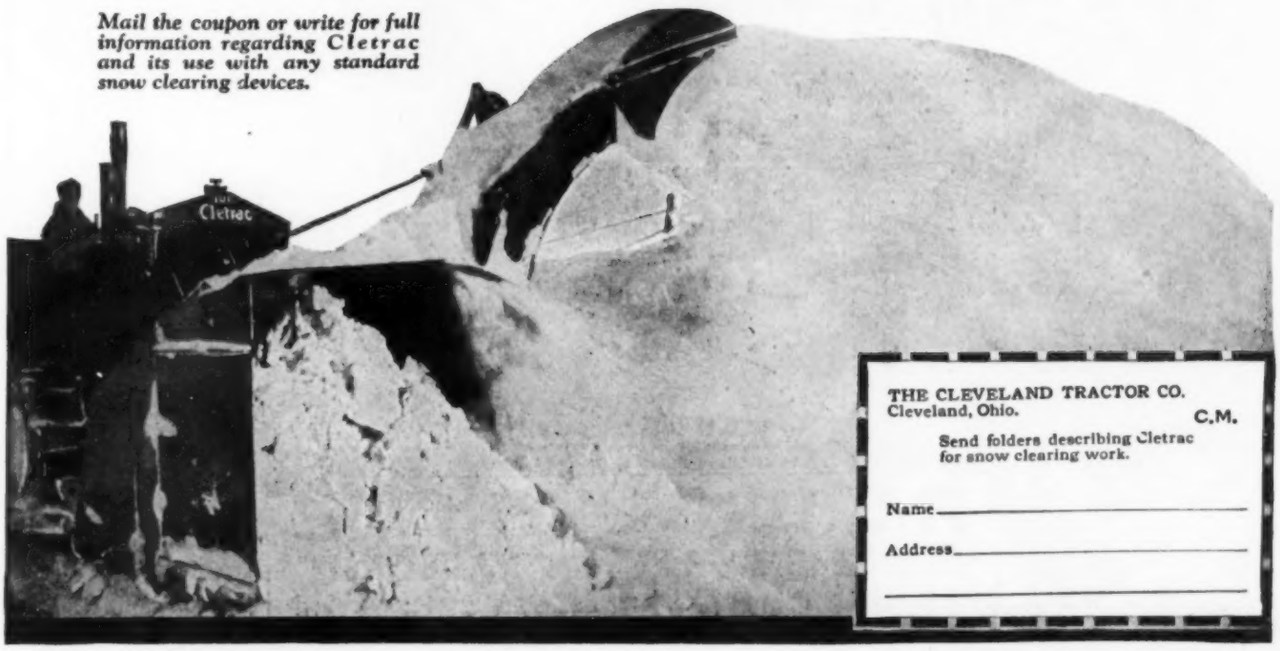
The One Tractor You Can Depend on to Meet Every Situation!

CLETRAC'S great records of power, speed and endurance in the work of snow removal have gained it world-wide recognition in this imporant field. In some of the "big-snow" sections and particularly for clearing mountain trails and highways, CLETRACS are considered literally the *only effective means for quick and successful clearing.*

The four powerful models of the CLETRAC line permit your choice of a power rating that will most economically and suitably meet your needs. And whether they are used for snow work, road work or other industrial use, they assure you speedier, better and less costly performance than can be had from any other tractor investment.

THE CLEVELAND TRACTOR CO., Cleveland, Ohio

Mail the coupon or write for full information regarding Cletrac and its use with any standard snow clearing devices.



THE CLEVELAND TRACTOR CO.
Cleveland, Ohio. C.M.

Send folders describing Cletrac for snow clearing work.

Name_____

Address_____

BROWNING

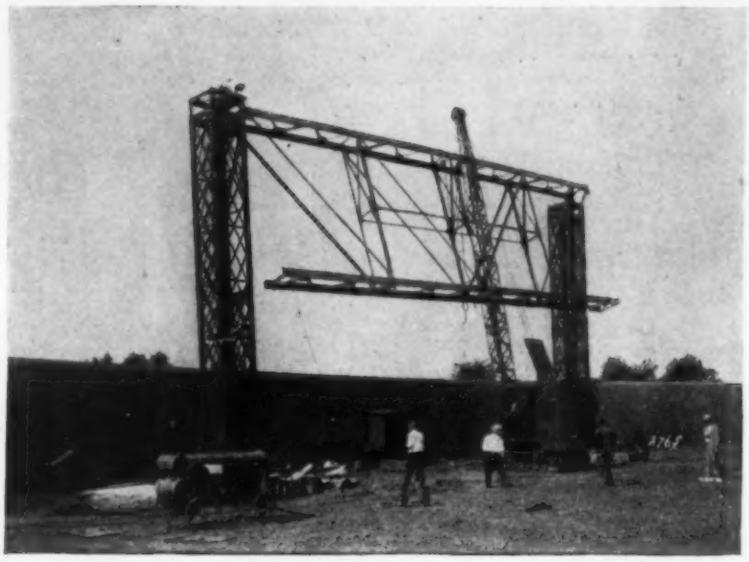
BROWNING utility knows no limitations! You can put a Browning Truck or Crawler Crane on any handling job and get more productive work done—and at a lower cost per working hour.

Brownings are fast and easy to handle; economical in operation and in upkeep; and long in point of serviceability.

We will be glad to show you how a Browning will save for you.

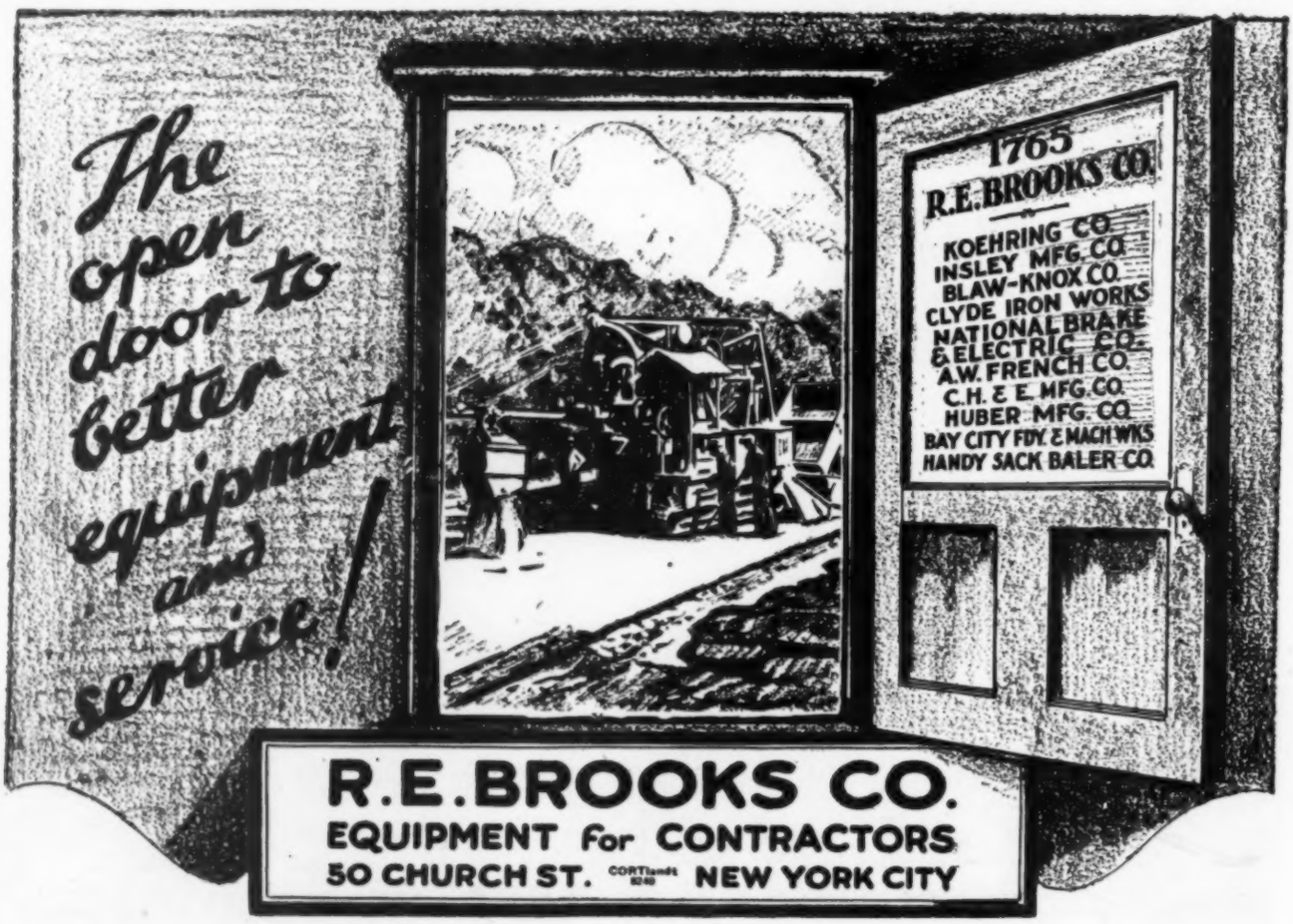
THE BROWNING CRANE COMPANY
16226 Waterloo Road
CLEVELAND, OHIO, U. S. A.
New York : Chicago : Pittsburgh · Birmingham

DISTRIBUTORS:
Portland : Los Angeles : Montreal : Toronto
San Francisco : New Orleans : Baltimore : Houston
Jacksonville : Boston



A Browning Crawler Crane on construction work on the American Legion Stadium, Birmingham, Ala. This crane equipped with a 40-ft. boom with a 20-ft. extension is setting a 6 ton steel span in place 42 feet high.

LOCOMOTIVE – TRUCK – CRAWLER CRANES
GAS – STEAM – ELECTRIC



Real Concrete—and how!

Engineers!
You can afford to specify **INUNDATION** to get concrete . like this

Contractors!
You can produce quality concrete with **INUNDATION**
You save labor - And - make a decided saving in cement
There is real economy

INUNDATION

THE Van Brunt Boulevard Subway Job in Kansas City, Mo., is a striking example of the *density*, *uniformity* and *strength* of concrete obtained with the Blaw-Knox INUNDATION SYSTEM.

Through the courtesy of Mr. R. M. Kerr, Assistant Engineer of the Kansas City Terminal Railway Company, the following facts are quoted.

Water Cement Ratio

"—A Blaw-Knox Inundator was used and perfect water control obtained." Depending upon the class of concrete—7, 6½ and 6 gallons of water were used per sack of cement and uniformly maintained.

Strength

Where 2000 lb. concrete was required, the actual strengths obtained ranged from 2100 to 2500 lbs.

Where 2500 lb. concrete was required, the actual strengths obtained were above 2500 lbs.

Where 3000 lb. concrete was required, the actual strengths obtained were above 3000 lbs.

Workability

"No trouble was experienced chuting the concrete and tamping it into the forms"—with a total water content of six gallons per sack of cement.

Uniformity

The tests for compressive strength show remarkable uniformity of the concrete.

Density

Dense concrete was obtained. The surface of walls and columns presents a pleasing appearance which was essential to the job.

Economy

"With 5400 cu. yds. of concrete involved—a saving of approximately 5700 sacks of cement has been effected through the use of the Blaw-Knox INUNDATION SYSTEM."

BLAW-KNOX PRODUCTS

STEEL BINS (Self-cleaning and Portable)
BATCHERPLANTS
For Central Mixing and Proportioning
MEASURING BATCHERS
For Volume or Weight
INUNDATION SYSTEM
For Concrete Concrete
STEEL FORMS for
Roads and Streets
Sidewalks and Curbs
General Construction
BUCKETS (Clamshell and Dragline)
TURNTABLES
STANDARD STEEL BUILDINGS
ELECTROFORGED STEEL GRATING AND FLOORING
AIR PREHEATERS
FORGE AND HAMMERWELDING
STEEL TRANSMISSION AND RADIO TOWERS
TRACYFIER
For Purification of Steam

MR. KERR'S article is interesting. A complete copy of it will be sent to you, including test reports on the concrete. A request from you will bring complete information about the economies and advantages of the Blaw-Knox INUNDATION SYSTEM.

MAIL THIS COUPON TODAY

BLAW-KNOX COMPANY,
686 Farmers Bank Bldg., Pittsburgh, Pa.

Please mail me a copy of R. M. Kerr's article on the Van Brunt Boulevard Subway Construction, your Form No. 1052. Also send me a copy of your Bulletin No. 996—the Blaw-Knox Inundation System.

Name _____ Address _____

City _____ State _____

TRADE MARK REG. U.S. PAT. OFFICE
BLAW-KNOX

BLAW-KNOX

"Domestic" Drainage Systems

give

Safety, Speed and Profits

on jobs below the surface of water saturated soils

To lay pipe in water-soaked sand 18 ft. below water level is usually a difficult job—but—"Domestic" Pumps and Point drainage gave firm sides and dry bottom on this job.

Special Plunger Pump for "Point" Drainage

If interested in drying up specified areas in water-soaked soils our Bulletin No. 288 will interest you . . . It's Free.

DOMESTIC ENGINE & PUMP CO.
N. Queen St., and P. R. R.
SHIPPENSBURG, PENNA.

C.M. 10-28

Jaeger Heavy Duty 10 S Holds 2 Bags

Built of Steel - ½ ton lighter, 50% stronger

AUTOMATIC SKIP SHAKER

Stops that man from pounding loader out of shape.

100% BALL BEARING

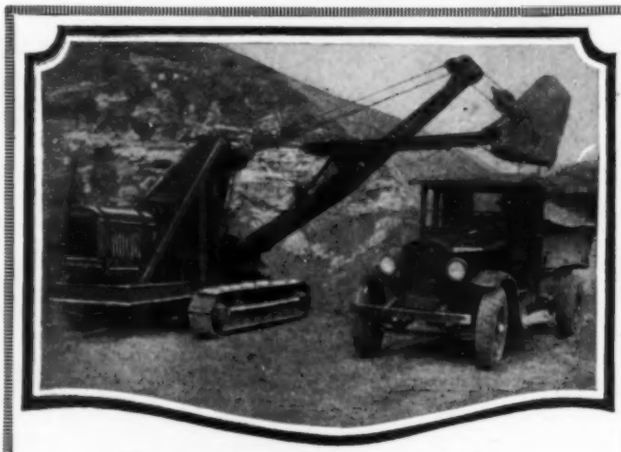
7-S SPEED KING

Fast - Portable - Sturdy

Skip Shaker loader, remixing drum action, Accurate Measure Water Tank and fast discharge (8 to 11 seconds) mean more thoro mixed concrete per day. Machined steel tracks, chilled ground faced rollers and ball bearings save power, save wear. Direct drive, one man control, dual tires for soft and hard ground.

Get our new low prices, terms on tilters or non-tilters, 3½ to 28 ft. sizes. OK'd by over 75,000 users.

THE JAEGER MACHINE CO.
800 Dublin Avenue, Columbus, Ohio



Stands in its tracks and slings the silica!

THIS Bay City Tractor Shovel, owned by the Saylor Silica Sand Co., Butler, Pa., is digging hard silica from a 25-ft. bank and swinging oversize loads into the truck. Look at the heaping load in excess of the half-yard.

Although the machine is not counterweighted, it doesn't tip with this oversize, right-angle load.

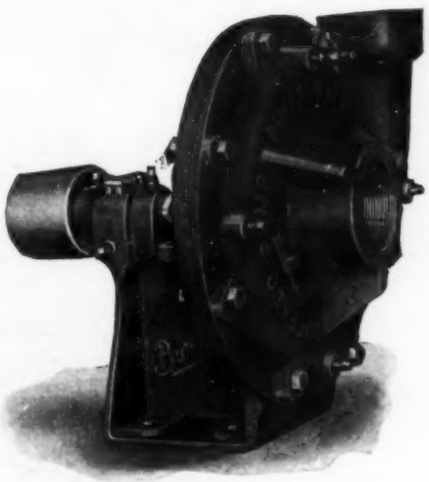
Every contractor should investigate this fast one-man convertible excavator. Bulletin T-4 contains some real "news" for men who would like to cut costs on all sorts of work.

BAY CITY DREDGE WORKS, Bay City, Mich.

BAY-CITY

TRACTOR SHOVELS — TRENCHERS — SKIMMERS

Buffalo "CH" Pumps are being used on almost every imaginable sort of pumping job that you can find!



Driven by belt or direct by electric motor or gas engine

Here are some of the places in which they are giving trouble-free and satisfactory service:—

On Construction Work
Railroads
Industrial Plants
Sand and Gravel Washeries
City Water Departments
City Sewer Departments
Gas and Electric Companies
etc., etc., etc.—

Think where YOU could use such a pump—one that delivers from 10 to 500 G.P.M. against a 10 to 120 Foot "Head"!

"CH" Pumps are built in five sizes to afford the service range best suited to your needs. They can be belt or direct driven by either electric or gasoline engine power. Some of our customers have adapted them (with a power take-off) to a light motor truck. The "CH" Pumps are of the highest Buffalo Standard quality and will give long, carefree service on the toughest job you can find for them. You will be surprised at their low selling price.—Use the coupon to get complete information.

Get in touch with our nearest branch office located in these cities:

Amarillo	Minneapolis	Seattle
Boston	New Orleans	St. Louis
Chicago	New York	Toledo
Charlotte	Omaha	Washington
Cincinnati	Philadelphia	
Cleveland	Pittsburgh	
Detroit	San Francisco	
Dallas		
Los Angeles		

Or send us this coupon today!

BUFFALO STEAM PUMP CO., Buffalo, N. Y.

Please send to.....

Address.....

Complete information on your line of "CH" Pumps. I want to pump — gal. per min. against a head of — ft.

Buffalo Steam Pump Company

183 Mortimer St., Buffalo, N. Y.

"Pump Builders for Half a Century"

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

More for Your Mixer Dollar *any way you figure it*

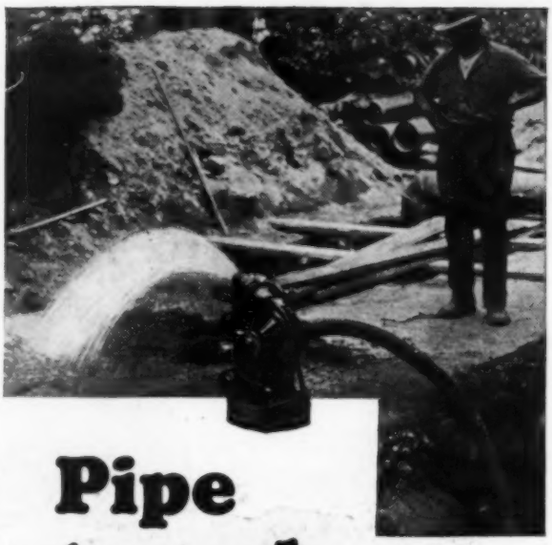
MARSH CAPRON 10-S

Marsh-Capron *Concrete Mixers*

The quality of Marsh-Capron mixers is established. We don't have to tell you how fast and how dependable they are on large or small jobs—you know what they are from actual use or from reputation. Our only trouble in selling Marsh-Capron Mixers is the FALSE IMPRESSION that they are High Priced. The true facts are that they are LOWER PRICED than SOME MIXERS and no higher than other standard makes.

CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA
Plants at Waterloo and Chicago Heights, Ill.

Construction Machinery Co., 448 Vinton St., Waterloo, Iowa.
Send Details of Marsh-Capron
Mixers .....Size ..... Type .....
Name .....
Street .....
City .....



Pipe trench flooded?

Put a Homelite Portable Centrifugal Pump on the job. Take it there in a flivver—weighs but 95 lbs. complete with air cooled gasoline engine and Robert Bosch magneto, and pumps

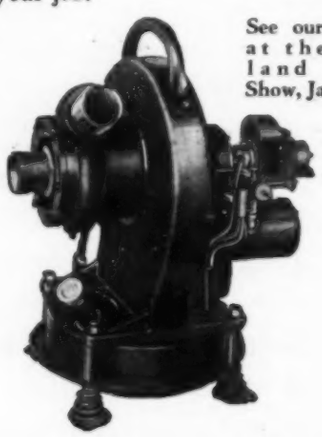
7,500 gal. per hr.

Husky construction—lasts for years. Bronze open type impeller, ball bearings. Costs only

$225
f.o.b. factory

Making good all over the world. Write for details and name of nearest distributor who will demonstrate on your job.

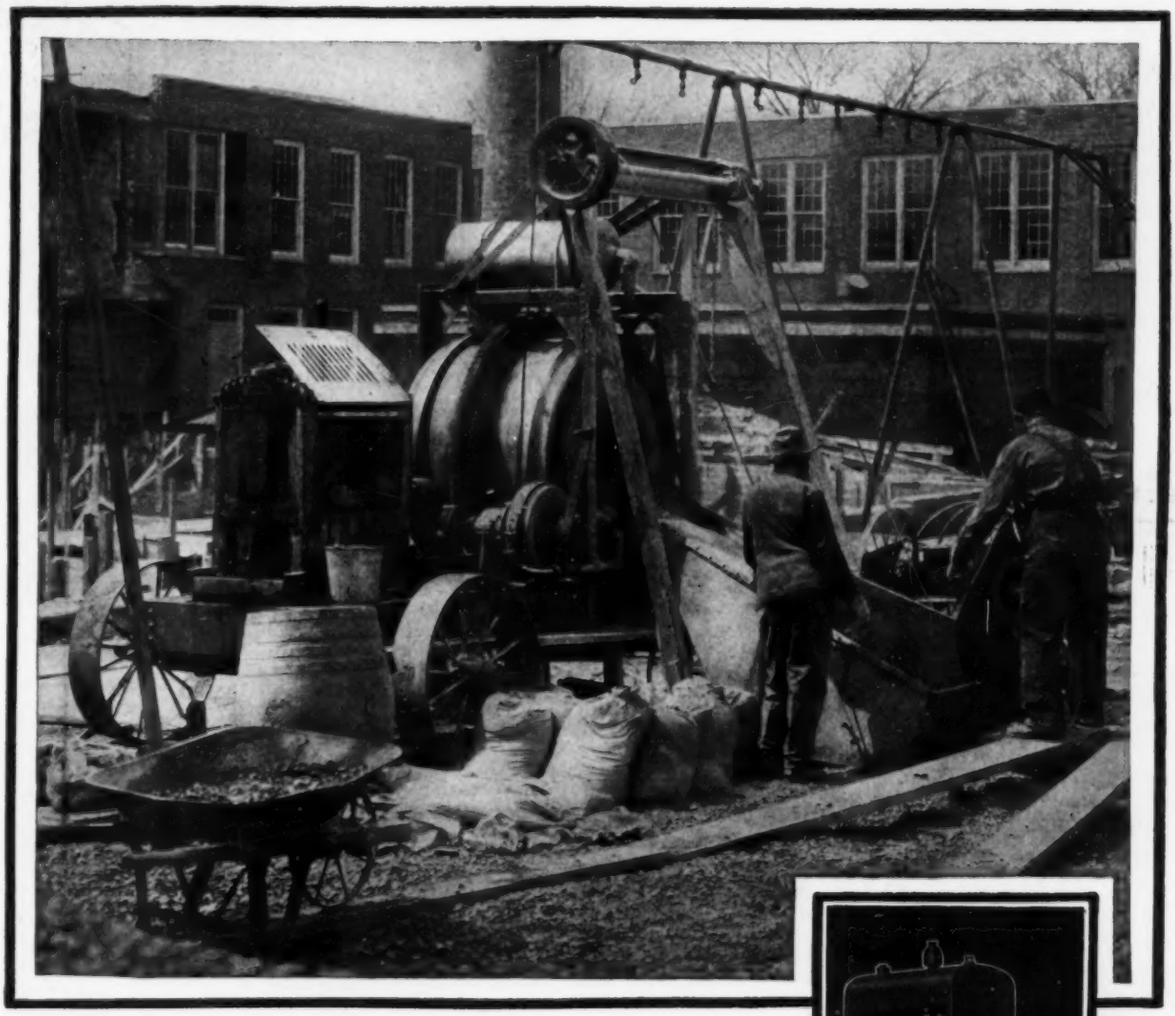
See our exhibit at the Cleveland Road Show, Jan. 14-18

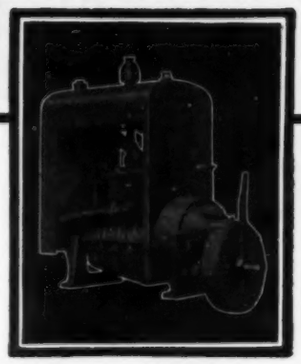


Homelite
Portable Centrifugal Pump

HOMELITE CORPORATION, Port Chester, N. Y.
Distributors in principal cities throughout the world. 2808

TEN YEARS OF *faultless operation*





EARLY in 1918—the O. F. Miller Co. of Kalamazoo, Mich., played a "hunch". They wanted a 4 cylinder gasoline engine to use on a mixer. They scanned the field of engines and *gambled on a Le Roi.*

Now,—in 1928—Mr. Miller says: "And at this time after 10 years of wonderful service, the Le Roi Engine functions as faultlessly as the first day it was used". That's typical of Le Roi Engines, long lived and dependable—and more—lowest operating and maintenance costs per day and per year. *Know the Le Roi by what it does.*

LE ROI COMPANY, *Milwaukee*

1929 ROAD SHOW
Cleveland
Jan. 14

LE ROI ENGINES

3 *to* 160 HORSE POWER

THE NORTHERN WAY
To Save Time and Money!

Keep Materials Moving

We furnish complete screening plants for handling sand and gravel. They are portable—easily moved from job to job.

Our representatives will be glad to assist you in the selection of the proper equipment for your particular job.

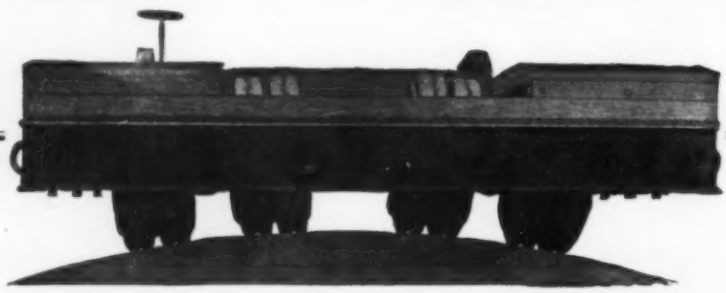
See the dealer nearest you or write for information

SPEED UP with a "Built Better" Northern! For handling sand, gravel, stone dirt or mixed concrete in the shortest time, with the least labor and a minimum expense, you can't beat a Northern.

It's the cost of the job that spells profit or loss for you. Here is where the performance of Northern equipment counts!

Northern equipment has consistently proved its ability to get "results."

Northern Conveyor & Mfg. Co. — — Janesville, Wis.



Rogers Rocking Axles Minimize *Tire Bills*

THE excessive wear on inside tires, frequently experienced with trailers having wide dual wheels on a full width axle, is entirely eliminated in the Rogers Trailer because, by means of the rocking axle, the load is equally distributed on all the tires.

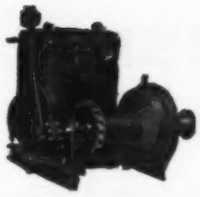
The 8 inch rocking movement also permits the use of full crown tires which have greater resiliency and load carrying capacity. Let us tell you more about the many advantages of Rogers rocking axles and other Rogers features. Write for new catalog.

ROGERS BROTHERS CORPORATION
106 Orchard St., Albion, Penna.

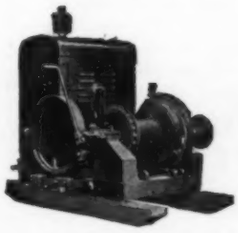
ROGERS TRAILERS

GOOSE NECK

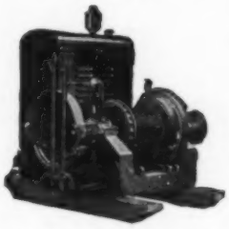
HEAVY DUTY



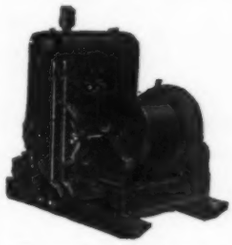
NH Light Duty Hoist



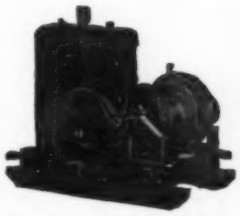
LH Single Drum



Light Duty Mining and Prospecting Hoist



Heavy Duty Mining and Prospecting Hoist



DH Heavy Duty Single Drum

Combination Hoist, Engine and Compressor Unit

For Every Job *a hoist that fits* Economically

NO matter what the job may be, up to 50 horse power, there is a Novo Hoist specially designed to cut lifting costs.

And in each hoist you will find those features of design and construction that make it the finest type of hoist for its particular job.

On the larger hoists you'll find the famous Novo double flywheels to absorb lifting shocks.

Where twisting strains are great you'll find the famous Novo Welded Frame with its sturdy tubular cross members.

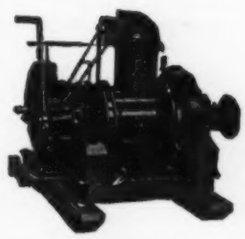
And in the entire line you'll find the extra heavy bearings and oversize parts that mean so much to life in the field.

If you have questions as to the type and size of hoist for a particular job, write for the *Novo Hoisting Handbook*. It is a summary of the things that Novo has learned about hoisting problems. It's not a catalog, but it is an on-the-job handbook.

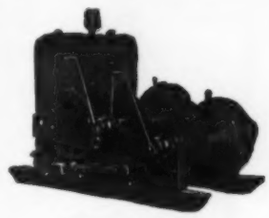
And it is free.

NOVO ENGINE COMPANY
214 Porter Street -:- Lansing, Michigan
Clarence E. Bement, Vice-Pres. & Gen. Mgr.

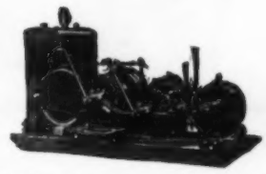
Deck Hoist



LH Single Drum

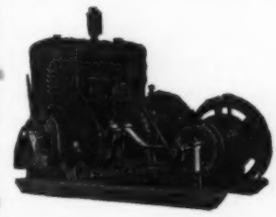


LH Double Drum



LH Double Drum, with 2-Speed Reversing Sheave Attachment

DH Heavy Duty Double Drum



DHG Heavy Duty Dragline

NOVO

PUMPS — ENGINES — HOISTS

Service, parts and sales in 65 cities

"It equals 7 wagons, 7 teams and 8 men"

Hauling a 7-yard crawler dump wagon on a road job at Baroda, Michigan, this Model 40 Bates Tractor is doing a job that illustrates the great saving in the use of BATES Tractors. With this outfit and two men as much dirt is being hauled and dumped as is being done by another outfit on this same job, consisting of 7 wagons with teams, and 8 men. On an 800 ft. haul the BATES is making over 50 trips a day. Due to their greater crawler surface on the ground, BATES tractors develop a greater drawbar pull than any tractor of their weight. Rugged construction, great reserve power, and fuel saving due to the Riccardo head motor, are a few of the features that have made friends for BATES machines.

BATES MANUFACTURING COMPANY

Joliet, Illinois, U. S. A.

3 Sizes

BATES 28 BATES 40
BATES 70

BATES
Tractors

This is Your Ticket

For a Free Tour of Over 50 Contracting Layouts

Here's a chance to make a free inspection tour of over 50 progressive contracting jobs, without going outside of your own door. Barber-Greene men have gathered information, pictures and layouts on interesting features of contracting work in every section of the country. The best of these have been collected in the 1927 edition of *Contracting with Barber-Greenes.* Sending this ticket brings your copy—send it today.

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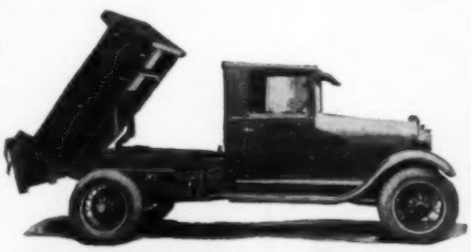
BARBER-GREENE CO. 530 W. Park Av., Aurora, Ill.
Representatives in Fifty Cities

BARBER GREENE

Portable Belt Conveyors · Self Feeding Bucket Loaders

Coal Loaders · · · · · Automatic Ditch Diggers · · · · · Coal Feeders



Bodies You Don't Have to Coddle

HUSKY as a steam shovel dipper! Compact—rugged—wear resisting, that's Hughes-Keenan Bodies. The rougher the going the better you'll appreciate their sturdiness.

Tough 10 gauge steel, one piece sides and bottom, electrically welded. Ideal loading height, high dumping angle, good dump clearance and sturdy, powerful, trouble-proof dumping mechanism. Everything to assure you the many thousands of loads that make the Hughes-Keenan dump body the best buy.

There are Hughes-Keenan Bodies for Ford, Chevrolet, Graham Bros. International, G.M.C. and all other trucks.

Ask your Dealer or Write us.

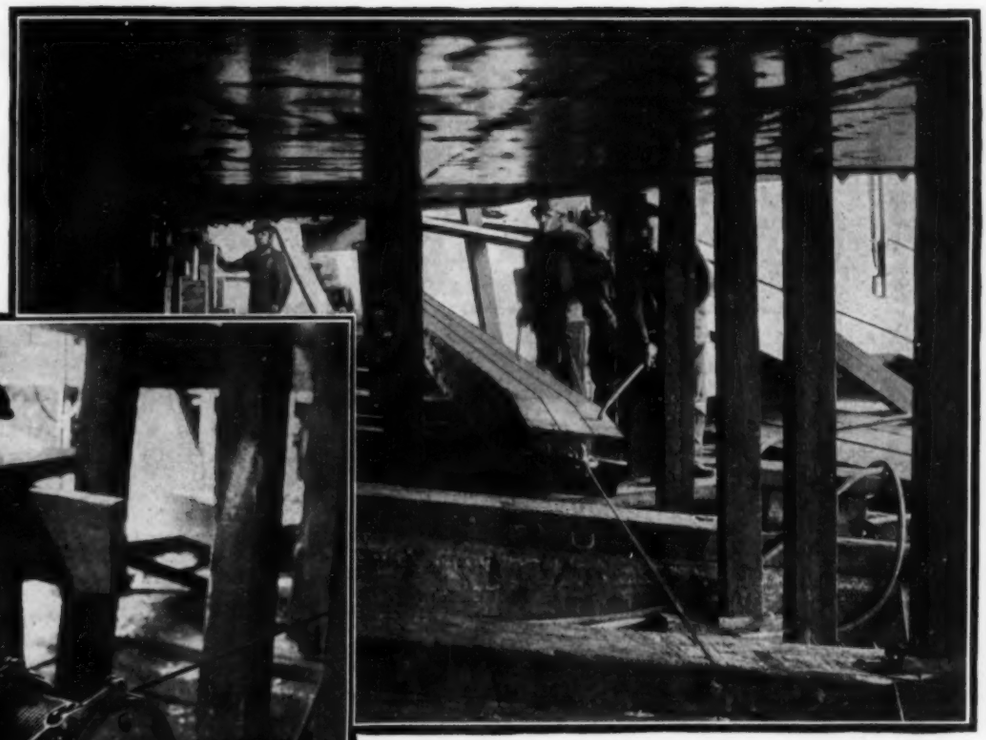
The Hughes-Keenan Co.
MANSFIELD, OHIO

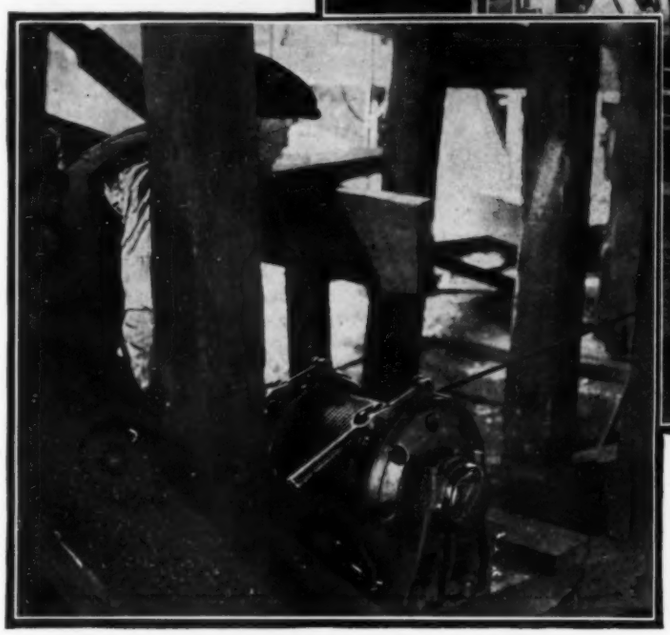
See Hughes-Keenan "Iron Mule" and Dump Bodies at 1929 Road Show.

HUGHES-KEENAN
Steel Dump Bodies

At right: One of the huge timber launching ways on the way to its position under the hull of the "B. F. Affleck."

Below: The Sullivan Hoist which drags in the ways at the yards of the Toledo Shipbuilding Yards.





345-lb. Hoist Replaces 14 Men

Sullivan Hoist Drags Timbers at a Big Saving

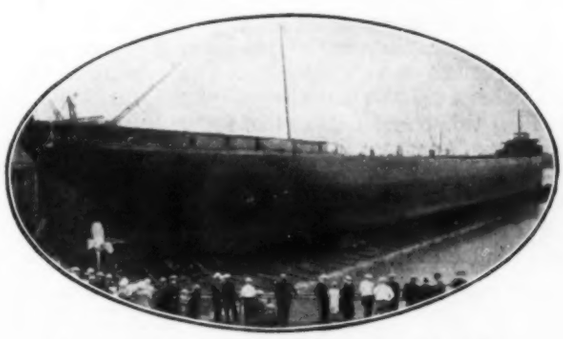
YESTERDAY, 15 men were tailing on a rope in a Toledo shipyard. A new vessel was ready for the water. And united effort and block and tackle dragged huge timber launching ways slowly to their places under the hull.

Today, one man and a 345-lb. Sullivan Turbinair Hoist skid the timbers in. Mounted close under the stern of the vessel, the hoist easily moves weighty oak timbers 18 inches wide, 16 inches thick, and 47 feet long. A little investigation by someone has effected a big saving for the Toledo Shipbuilding Company.

But handling timbers is only one of the many tasks Sullivan Hoists are doing. They pull, switch, and load cars—drag stock pile scrapers—pile lumber—and handle derricks, and spoil buckets. Often their small investment and easy operation result in annual savings several times the cost of the hoist.

345-lb. models will lift a ton on single line or pull a 50-ton car on level track. Air and Electric, one and two-drum hoists are available. The hoist picture book will show you how others are saving money with Sullivan Hoists. Shall we send it?

Just write for the picture book, "Handy Hoisting and Hauling."



Launching the good ship "B. F. Affleck" at the Toledo Shipbuilding Yard

Sullivan Machinery Company
168 S. Michigan Avenue
CHICAGO

S U L TRADE L MARK I V A N

Why The Thor Six COMPRESSOR Delivers 26% More Air?

It's All in the *Super-Charger*

The reason the THOR SIX COMPRESSOR delivers 26% more air than any other compressor of the same rated capacity is that it has a super-charger. The Rix Super-Charger is an exclusive, patented feature that enables the piston on its idle or downward stroke to compress the additional air the THOR delivers.

Instead of the THOR being 60% or 65% efficient, as is the case with other compressors, the Super-Charger makes it 83% efficient. In other words, the THOR SIX is rated at 116 cu.ft. and actually delivers 96 cu.ft. of air per minute.

You not only get more air from a THOR, but you also get a compressor that is designed and built along modern engineering principles. The THOR is direct-connected, both engine and compressor being mounted on a common crank case, eliminating gears, clutches and couplings. Ask any THOR user how this construction has reduced his upkeep cost.

By all means, investigate the THOR SIX. It isn't going to cost you anything but a few minutes of your time and the saving involved is well worth it. Write for Bulletin 103.

THOR PAVING BREAKERS deliver a powerful hard-hitting blow. Do not freeze in severe weather. No vibration —no kick back. Patented steel retainer prevents chisel from dropping out of nozzle.

INDEPENDENT PNEUMATIC TOOL CO.

PNEUMATIC TOOLS — ELECTRIC TOOLS

GENERAL OFFICES 600 W. Jackson Blvd. CHICAGO

FACTORY AURORA, ILL. — BRANCHES THE WORLD OVER.

Eastern Office 1463 Broadway, New York. — London Office 40 Broadway, Westminster, London.

This one-man hammer for driving 2-in. wood sheeting weighs 97 lbs., strikes a 275-lb. blow at 550 per minute. A great time and money saver. Easy to operate and easy to move about. Compact and sturdy. No exposed valves or working parts.

For 3-in. wood sheeting, use the Junior Hammer, weighing 220 lb., delivering a 400-lb. blow at 450 per minute.

Other pile driving hammers up to 21,000 lbs. for steam or pneumatic operation.
Ten sizes to choose from.

UNION IRON WORKS
Lackawanna Siding, Hoboken, N. J.

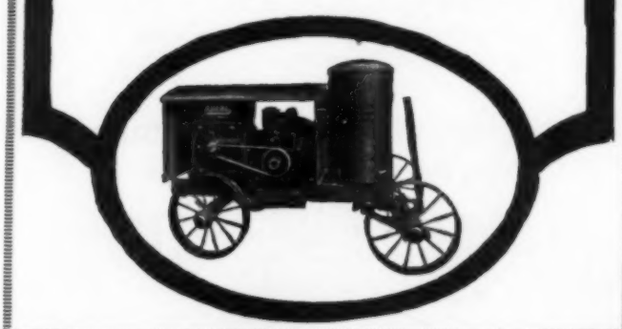
Buhl
AIR COMPRESSORS

Below is illustrated the BUHL Type C Portable Compressor—one of the many different types of this popular line. Moderate in original cost and low in upkeep.

There are six sizes of portable air compressors in the BUHL line to choose from. For operating jack hammers, riveters, clay spades, concrete breakers, etc. The BUHL gives dependable air power at low cost—send for bulletins today.

Sales offices in principal cities

THE BUHL COMPANY
Manufacturers
37 W. Van Buren St., CHICAGO



CONTRACTORS

make use of the

LOWELL

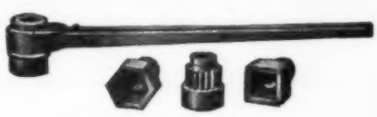
Reversible Ratchet Wrench

In Many Different Ways

Every pattern shown below is in actual use by the contractors of this country.

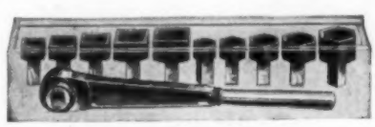
Lag Screw Pattern

Finished in black enamel with socket openings both hexagon and square from ½-in. to 1 13/16-in. across the flats.



Steel Socket Bridge Pattern

Finished in black enamel with socket openings both hexagon and square from 1-in. to 5-in. across the flats.



Multiplex Set

No. 1—Capacity ¼-in. to ¾-in. inclusive.
No. 2—Capacity ¾-in. to 1 ¼-in. inclusive.
Expressed in both diameters.

Write for Catalogue M, inform us as to your line of work, and we will tell you how others in similar lines are profitably using

LOWELL REVERSIBLE RATCHET WRENCHES

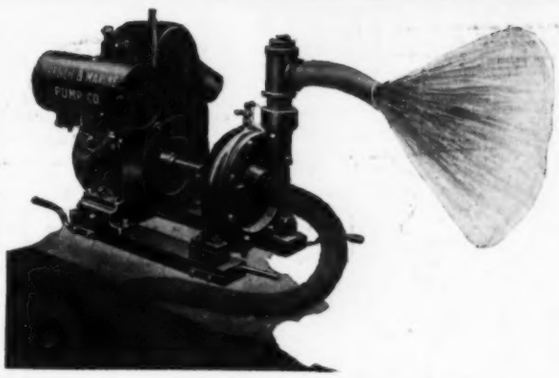
LOWELL

WRENCH CO.

WORCESTER, MASS., U. S. A.

TRENCHMARINE

Portable Pumps



Dirty Water Cannot Clog These Pumps

Capacities up to 8400 Gallons per Hour

FOR pumping clean or dirty water from trenches, sewers, cellers, quarries, reservoirs, barges, ships and cesspools.

Self-contained, compact, light—easily transported, not to light for hard work, and always ready for action.

Four cycle engine—High tension magneto—open impeller pump. All parts easily accessible.

Air-cooled—cannot freeze in cold weather—does not heat up in hot weather.

Simple enough for any laborer to operate.

No. 1½—$100.00 (F.O.B., N. Y.) No. 2—$160.00 (F.O.B., N. Y.)

DISTRIBUTORS' INQUIRIES INVITED

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"ANTI-HYDRO" Solved a Difficult Problem Here

This building settled about one inch while it was under construction—after half of the cement topping had been placed on the first floor. The contractor was faced with the problem of how to obtain a perfect bond between a new one-inch topping and the newly finished, smoothly trowelled concrete floor.

"ANTI-HYDRO" came to the rescue. It was used in accordance with the standard "ANTI-HYDRO" specifications, and a new topping placed over the entire floor.

"ANTI-HYDRO" was used only after a five-year guarantee was authorized, covering the maintenance of a waterproof, hard and dustless cement floor, and the bonding of the new topping to the underlying topping and slab.

Results were so satisfactory that "ANTI-HYDRO" was also used for bonding and waterproofing the cement stucco on the outside of the building, and in the cement plaster on the inside of all exterior walls.

You can always depend on "ANTI-HYDRO," no matter how difficult the job may seem. It hardens and waterproofs concrete *in one operation* and at one cost. Easy to use, too. Simply add it to the mixing water. Results are guaranteed *permanent*. Instead of taking chances use "ANTI-HYDRO" and be sure.

ANTI-HYDRO FOR PERMANENT CONCRETE
HARDENS WATERPROOFS

ANTI-HYDRO WATERPROOFING Co.

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REUTER SEED FACTORY
NEW ORLEANS, LA.

WM. R. BURK, ARCHT. & W. HORACE WILLIAMS CO., CONTR.

A New Feature in an Old Stand-by

TOLEDO TORCHES are now equipped with a NEW BURNER which greatly improves their serviceability.
No Price Changes!
Just more for the money.

No projecting parts to damage. Insures constant flow of fuel at right temperature in any weather. Correct length of wick projection always assured. Prevents back-slippage and loss of wick inside the torch. Interchangeable with all previous models. Makes THE TOLEDO TORCH the last word in protection of construction work at night.

THE TOLEDO TORCH
RIGHTS ITSELF FROM ANY POSITION

Greater Protection at Lower Cost

Storm-proof
Theft-proof
Reliable
Safe

THE TOLEDO PRESSED STEEL CO.
12th and Woodruff Toledo, Ohio

To present users of

TOLEDO TORCHES:

Your old torches may be equipped with new burners. Ask your dealer or write us direct.

DIGGING

The bucket presents its teeth and cutting edge normal to the face of the cut, due to the adjustable control bridles. The "four point pull" hauling bridle keeps the bucket in this position throughout its digging path.

The "4-point pull" insures better digging

DUMPING

This position shows the open mouth, which allows easy filling of the bucket and free discharging of the load.

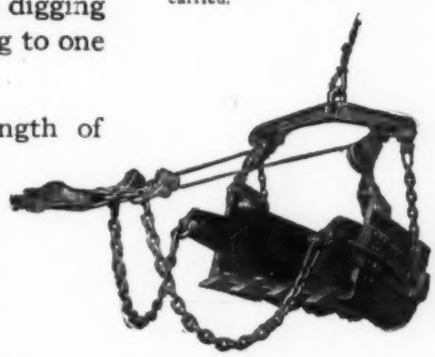
NOTICE the hauling bridle of a Hayward Drag Line Bucket. See how four different lines (two chains and two steel ropes) exert an equalized pull.

Watch this drag line bucket in action and see how well the 4-point pull works. It keeps the bucket in one position throughout its digging path. There is no tipping over, or tilting to one side with consequent small loads.

This feature, combined with the strength of Hayward construction insures powerful digging. Hayward design provides easy filling and quick dumping. May we send you pamphlet No. 666a, which describes Hayward Drag Line Buckets?

CARRYING

No matter how large or small the load may be, the bucket will carry it at the proper angle to the dumping point with a minimum amount of spilling. The arched spreader bar allows a maximum amount of overload to be dug and carried.



THE HAYWARD COMPANY

44 Dey Street New York, N. Y.

Builders of Clam Shell Drag Line, Orange Peel and Electric Motor Buckets; Dredging, Excavating and Coal Handling Machinery, Automatic Take-up Reels; Counterweight Drums.

HAYCO

Hayward Buckets

ESTIMATING BUILDING COSTS — DINGMAN
PLAN READING AND QUANTITY SURVEYING — DINGMAN
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The Dingman BUILDING CONTRACTORS' POCKETBOOK LIBRARY

5 handy pocket-size volumes, covering practical construction work, from estimating costs to selling service.

HERE, offered for the first time as a complete unit, is a set of books that will help the building contractor increase his working efficiency and the profits of his business. Each and every one of the volumes in the set is a practical handbook on some important phase of building construction work and management—each is full of plans and methods for saving time, money, materials and labor.

The Dingman books have won a wide reputation among builders and building contractors for their sound, practical and easy-to-understand discussion of building construction work. All of the material has been drawn from actual practice.

This library is intended for

(1) The building contractor who wants a handy reference set that will give him almost instantly a ready answer to most of the problems that come up in the course of the day's work.

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Examine this new library for 10 days FREE!

Without a cent of expense—without any obligation on your part—you may examine the Dingman Building Contractors' Library for 10 days and determine its value for yourself. Try the books out on your everyday problems—make them prove their worth to you. Unless they meet every test send them back at our expense. If the books prove satisfactory and you decide to keep them, pay only $2.00 in ten days and then $2.00 a month for five months.

Every contractor and builder, every architect and engineer, every student and executive, who is seeking practical help on the everyday problems connected with building construction work should have this valuable reference library.

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Send me for 10 days' free examination, all charges prepaid, the Dingman Building Contractors' Pocketbook Library in 5 handy pocket-size volumes. If I find them satisfactory I will send you $2.00 in ten days and $2.00 a month until the special price of $12.00 has been paid. If I do not want them I will send them back at your expense at the end of 10 days.

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All in the Day's Work

Hard clay, sticky clay, shale, broken stone, it's all in the day's digging work to a Cleveland Clay and Trench Digger.

Without exception Cleveland Diggers prove faster, more efficient, more rugged, more economical. The valveless design ensures high cutting speed and low air consumption.

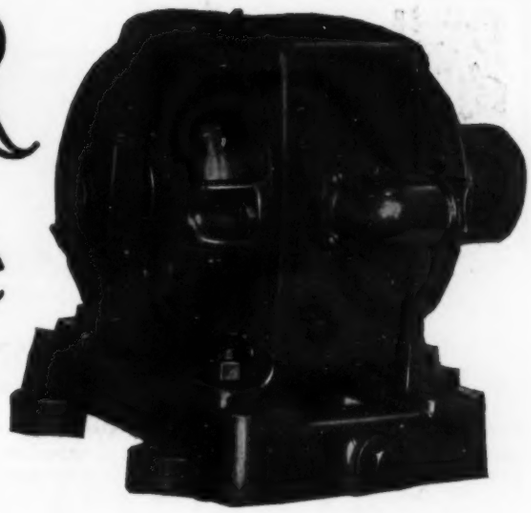
It's not unusual for Cleveland Diggers to effect a cost saving of 75% over old-fashioned hand methods.

If you don't use Cleveland Diggers, ask about them. We'll be glad to demonstrate any time at your convenience.

The Cleveland Rock Drill Co.
3734 E. 78th St.
Cleveland, Ohio

CLEVELAND ROCK DRILLS

Type SCR
A remarkable single-phase Motor ~



In operating many types of construction equipment, single-phase motors have several important advantages over other kinds of available power units:

1. Single-phase power is more commonly available.
2. Single-phase motors have leads brought out for two voltages—either 110/220 volts or 220/440 volts—and since single-phase motors can be operated from polyphase circuits by connecting in on one phase, they are operative on six different circuits, i.e., two voltages on one- two-, and three-phase lines.
3. Single-phase motors lend themselves to simple control and, hence, do not lessen the portability of the machines which they operate.

General Electric's single-phase motor—Type SCR—is different from all others in that it is a self-contained unit with no short-circuiting switches, centrifugal devices, brush-lifting mechanisms, or condensers.

Because of its unique design, Type SCR possesses important characteristics for driving construction equipment.

1. *It has no complicated mechanisms to get out of order.*
2. *Because of unusual torque characteristics, it will start and bring heavy loads up to speed without faltering.*
3. *It will operate successfully even when the voltage is as low as 75% of rated voltage.*
4. *Its practically perfect commutation insures long brush life.*
5. *Power-factor approaches unity, and efficiency is high.*

Wherever the service is single-phase, select the SCR.

GE Motorized Power
—fitted to every need

204-14

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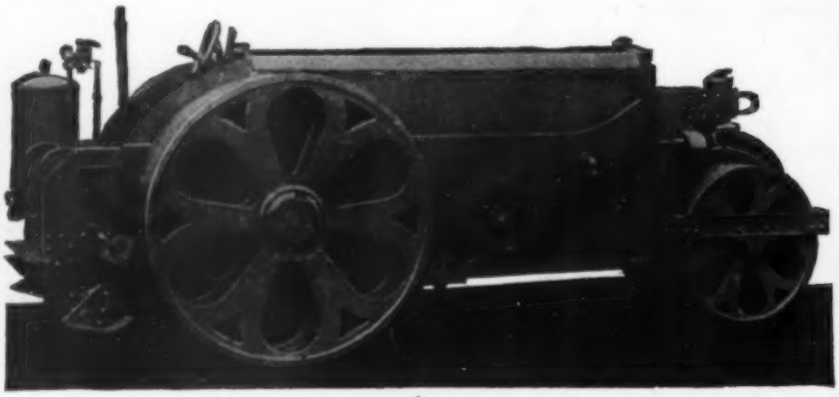
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES



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4 CYLINDER

MOTOR ROLLERS

Powerful and dependable, quick in action, economical to operate. Made in 4 sizes (5-7-10-12 Tons). Send for Huber Motor Roller Catalog.

THE HUBER MFG. CO.

315 E. Center St., Marion, Ohio

ROLLERS

The Up-to-dateness of the

BUFFALO SPRINGFIELD

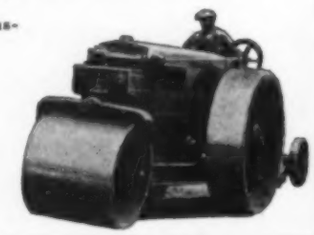
accounts for the nation-wide preference of street and road builders for this particular make of equipment. That this preference actually does exist all over the country may be verified very quickly by anyone inclined to make a survey of the roller equipment in use in his particular section of the country.

Buffalo-Springfield rollers, both motor and steam, are designed to meet all sorts of conditions and are built in many models and sizes.

Scarifiers and other special attachments optional.

Send for Latest Booklet illustrating entire line.

The Buffalo-Springfield Roller Co.,
Springfield, Ohio



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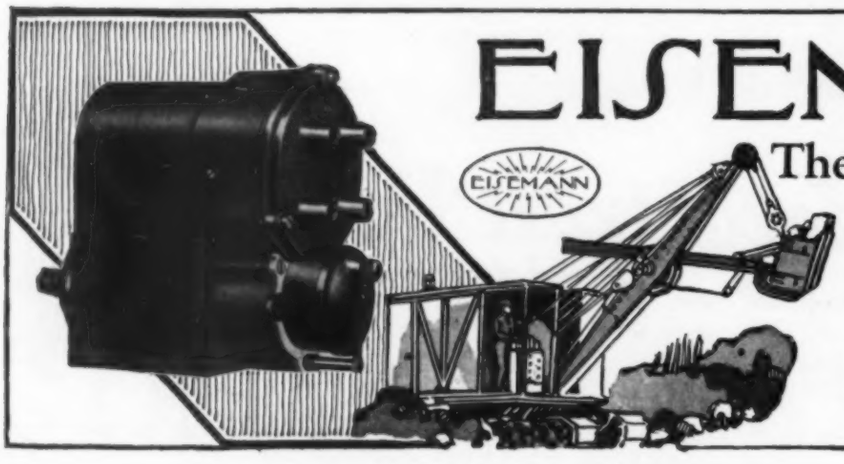
ONE-MAN AUTOMATIC

Rotary Scrapers

Larger capacity—increased yardage. Automatic draft control permits continuous operation. No stopping. Narrow replaceable cutting edge cuts upkeep costs. Four sizes for any tractor—capacities 13 to 40 cu. ft.

Send for Bulletin No. 256

The Baker Manufacturing Co.
568 Stanford Ave., Springfield, Ill.



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The overwhelming choice of the builders of high quality equipment. Favored by contractors everywhere.

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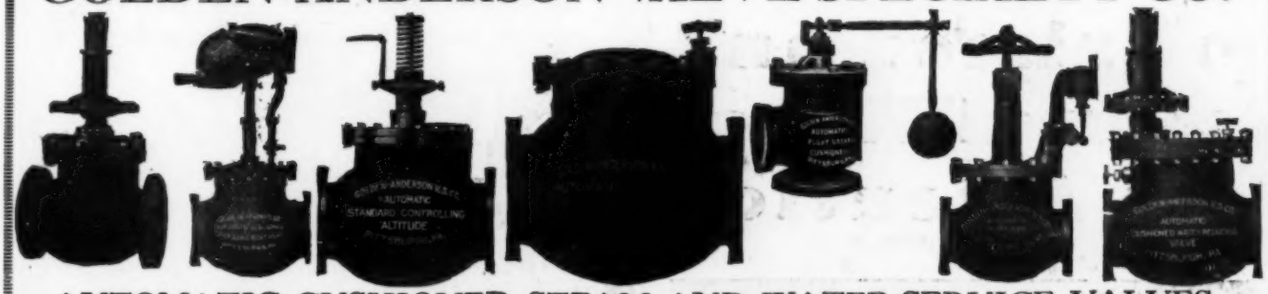
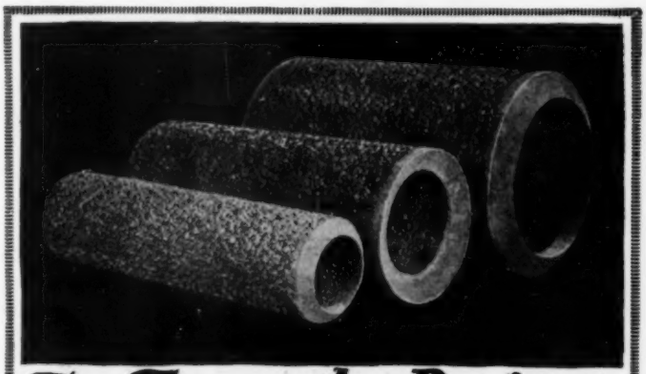


AUTOMATIC CUSHIONED STEAM AND WATER-SERVICE VALVES

"We Challenge to Test for Merits Any Automatic Steam or Water-Service Valves in the World"

1230 Fulton Bldg. PITTSBURGH, PA.



Ten Times the Drainage Capacity of Other Pipes

"A FOOT OF DRAINAGE FOR EVERY FOOT OF PIPE"

"The Water Seeps in and Then Flows Through"

"NO OPEN JOINTS"

Walker Cement Products, Inc.

Little Ferry N.J.

Plants at Little Ferry, N.J. & Baldwin L.I. N.Y.

WALKER POROSWALL RAPID DRAIN PIPE

GET NEW LOW PRICES!

HIGHEST QUALITY CONSTRUCTION EVER USED

Amazing factors of strength and efficiency. Compare the BOSS Drum with the mixing drum of any outfit within $250 of its price. All steel, electrically welded, leak proof; 800-lb. less dead load for engine. Steel castings and forgings where strain is great. Hyatt Bearings save power and oil. Massive semi-steel gears. Alemite lubrication. Learn all the BOSS means to you.

High Speed Mixing and Discharge

Patented re-mixing action produces exceptionally strong, uniform aggregate—10 cu. ft. per batch. Finger touch discharge action—8 to 12 seconds. 10-12 h.p. multicylinder Novo and LeRoi engines. A fast-working, dependable outfit at a price that's RIGHT. Easy To Buy.

THE BOSS ONE-TWO BAGGER MIXER

Act NOW!

Look into this. Write today for money-saving facts and prices.

BOSS Mixers are built in all sizes and types.

BOSS Hoists—Single and Double Drum.

Write Today!

AMERICAN CEMENT MACHINE CO., Inc.

246 South Fourth Street KEOKUK, IOWA

HUMDINGER PUMPS

Non-clogging, everlasting rubber ball valves, totally enclosed, running-in-oil jacks, bronze bushed bearings, all steel trucks, and enclosed engine crank cases make HUMDINGER PUMPS.

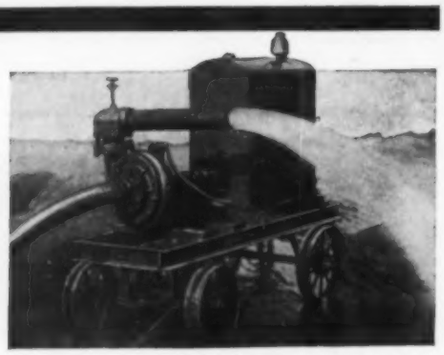
THE CONTRACTOR'S CHOICE

Full detail description given in Bulletin No. 1034 CM. Send for a copy.

RALPH B. CARTER CO., 126 Chambers St., New York

Factory: Hackensack, N. J.

Primed and Reprimed Without Any Attention



Type MEP Centrifugal Pump—Automatically Primed. Furnished complete including LeRoi engine. Built to stand the gaff of continuous service, yet light weight. Six sizes; capacities to 1,200 gals. per min.; suction lifts to 20 ft. Low priced.

Barton Centrifugal Pump — Automatically primed. Attaches to front of any car or truck and automobile engine drives it. Dependable; light weight; does not interfere with driving. Five sizes; capacities to 900 gals. per min.; suction lifts to 20 ft. Low priced.

HERE'S the way to "speed up" your pumping jobs; use American-Marsh Pumps. Everyone of them comes equipped with a sure-fire Automatic Primer that primes and reprimes the pump without ANY attention. Stop paying a man $3 to $5 per day to watch drainage operations! Plug up those leaks!

These pumps will handle dirtiest of water. They're large capacity, reliable, trouble-free. Let's show you how and why. Use coupon below, checking as interested.

AMERICAN-MARSH
Contractors Pumps

AMERICAN STEAM PUMP COMPANY
BATTLE CREEK, MICHIGAN.

☐ Send Bulletin 59 on Type MEP Pumps.

☐ Send Bulletin 56 on Barton Pumps.

Name .....

Address .....

To make your unwatering and water supply problems easier!

THIS Morris Portable All-Purpose Pump handles anything from clear water to floating dirt, sand and gravel, delivers 300 to 600 gals. per min., can be used for heads up to 50 ft., and is easy to cart from one job to another. For general water supply, unwatering excavations, sumps, etc., it can't be beat.

Write for literature about this and other sizes of Morris Pumps

MORRIS MACHINE WORKS, Baldwinsville, N.Y.

MORRIS
CENTRIFUGAL PUMPS

For the man

who borrows *your* copy of "Construction Methods"

We all know him. He doesn't mean to bother you. He really means it when he says he'll return your copy.

But you know that, for some reason or other, he seldom does.

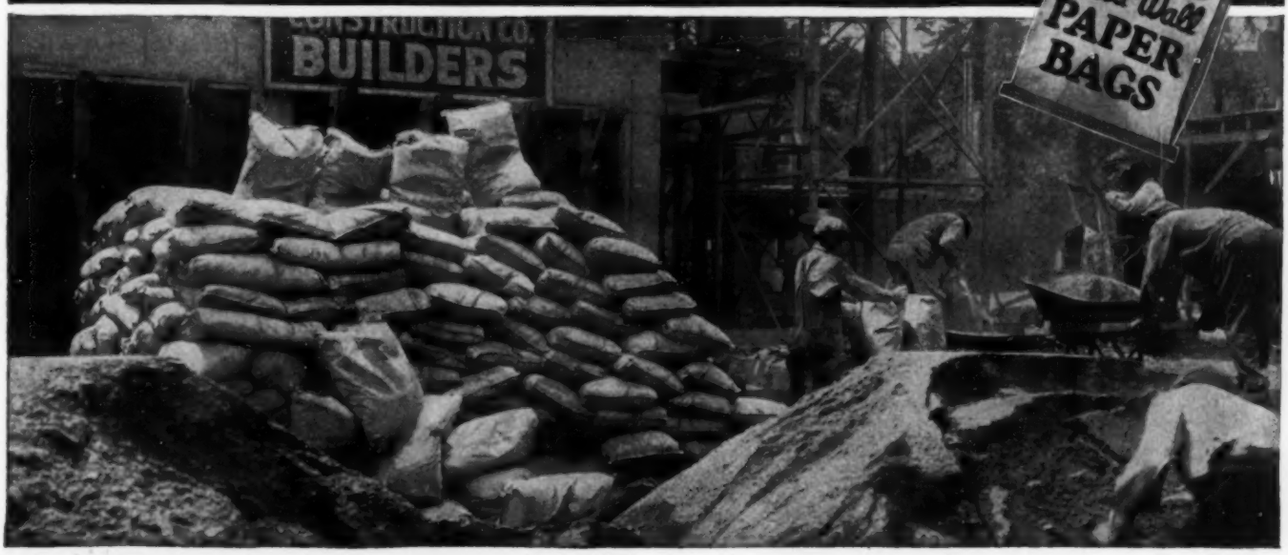
Tell him for $1, he can get his *own* copy each month for the next two years.

Count the cost over a period of years ~

and you will buy all your Cement and Plaster in Bates Multi-Wall Paper Bags ~~~~~

Bates Multi-Wall Paper Bags are made exclusively by the Bates Valve Bag Corporation in 8 modern plants throughout the country.

BATES VALVE BAG CORPORATION
General Offices: 35 East Wacker Drive, Chicago, Ill.



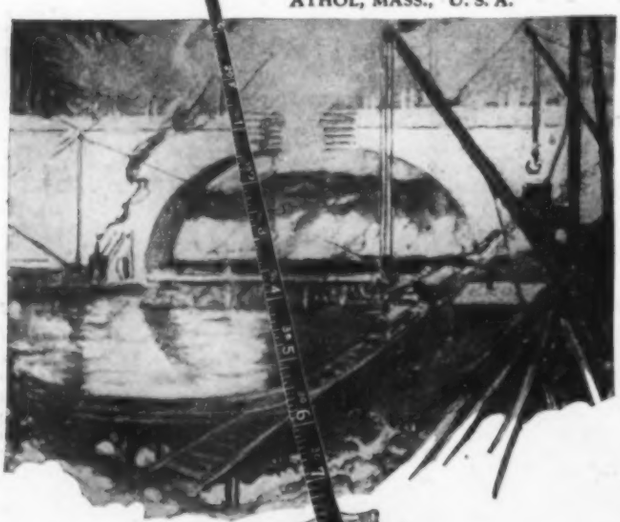
BATES Multi-Wall PAPER BAGS

Here's a tape for a man

A Starrett Stainless Steel Tape—use it anywhere—in mud, rain, salt water—it will not rust. It never needs to be scoured, the figures stay clear and bright.

Ask for Starrett No. 521 in feet, tenths and hundredths or No. 520 in feet, inches and eighths. Made in 50 and 100 ft. lengths with the Starrett Quick Reading Graduations, Push Button and substantial leather case.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
ATHOL, MASS., U. S. A.

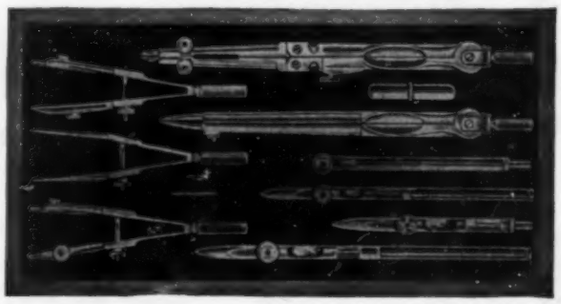


See these superior tapes at your dealer's, and write us for complete description of other Starrett tapes, transits and levels. Catalog 24"NF" will be sent free on request.

Use Starrett Tools

2302

This splendid set of
SOELLNER Drawing Instruments



Set No. 1894

is made of rolled German Silver and best English Steel. It is very attractive in appearance and of superior workmanship throughout.

It Contains
3—3½" Bows
2—Ruling Pens
1—6" Compass with attachments
1—6" Divider

$6

Complete, in velvet lined case, postage paid.

KOLESCH & CO.
138 Fulton St., New York
Established 1885

Building Levees, Embankments, Etc., at Reduced Costs

The Harahan viaduct at Memphis, Tenn., required the building of a dirt embankment about 2½ miles long, ranging in height from 20 to 40 feet. The contractor decided to use a Sauerman levee-building machine with a 4 cu. yd. "Crescent" Drag Scraper—and here's what he found.

In using this machine—capable of handling over 300 cu. yds. of dirt per hour—the contractor was able to dig and convey the dirt from cut to fill in one continuous operation—with only one machine—with only one man doing the operating.

Catalog No. 10 gives you a lot more information—write for it.

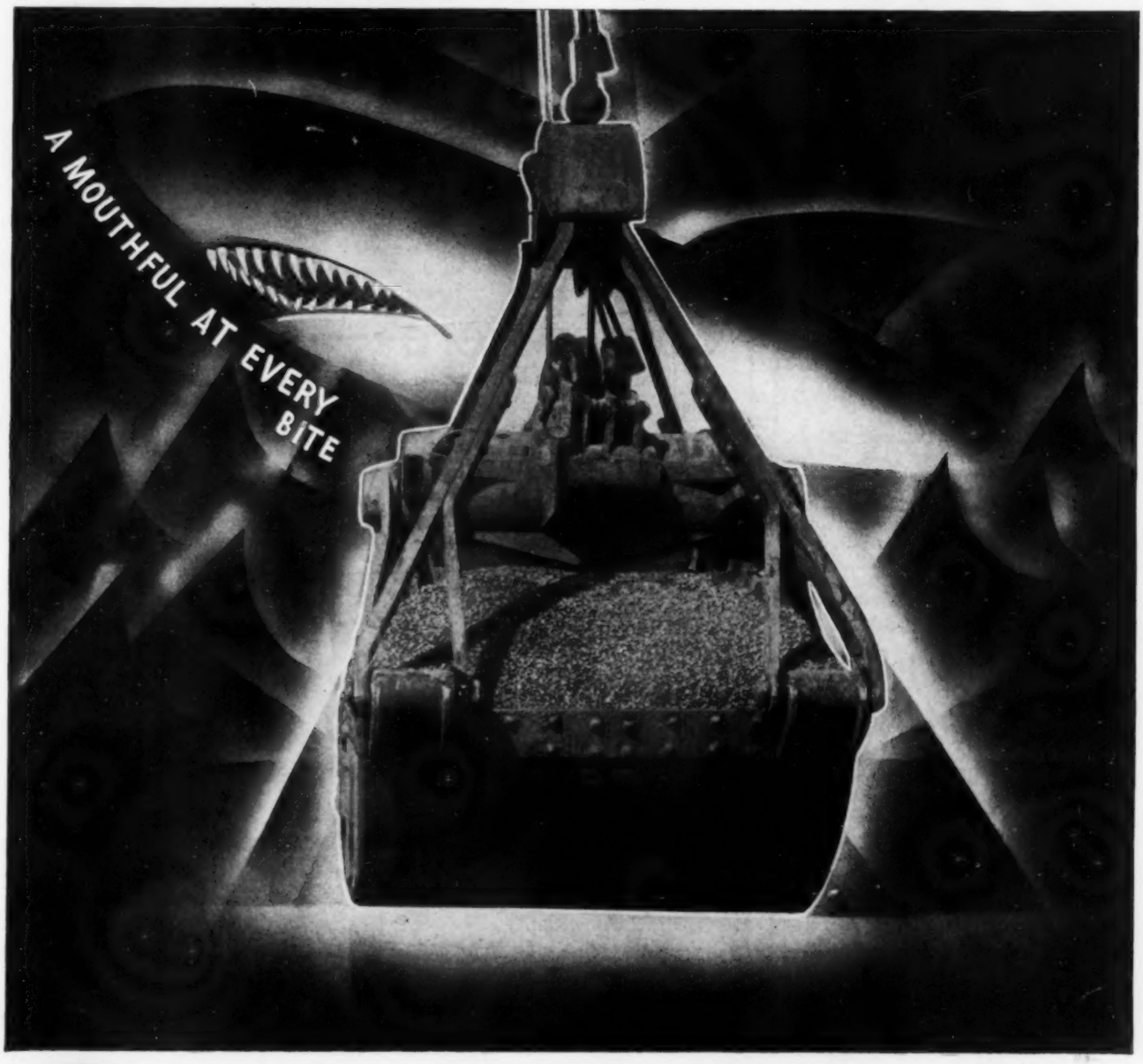
SAUERMAN BROS., Inc.
480 S. Clinton St., CHICAGO

Built exceptionally wide and long . . . a monstrous mouth when opened . . . with a capacity grab when closed—overloads when the material is deep . . . and everything within its unusual range gathered up, clean . . . that's the "proved in action" story of the Owen Type "S" Clean-up Bucket.

It's a big bucket, designed on big sturdy lines for big clean-up work. It has all the features that give every Owen Bucket superior strength, easy operation and endurance, plus additional reinforcement due to its liberal size and spread. Grit-proof lubrication throughout.

Can't equal it in efficiency for fast work on barges, flats, cars and stockpiles in such materials as sand, gravel, fertilizer, ashes, cinders, etc.

Write for details on this remarkable Owen Bucket—and for a Catalog showing all the Owen types. The Owen Bucket Company, 6023 Breakwater Avenue, Cleveland Ohio.



OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAY'S WORK

Owen Buckets

CONOWINGO

Announcing the purchase of construction equipment used at Conowingo, the following partial list of late model equipment, purchased new since 1925, is located at Conowingo Dam, Conowingo, Maryland, near Baltimore. Ask our nearest office for complete list and prices.

COMPRESSORS

4—Ingersoll-Rand, Type XCB2—877 cu.ft. cap., belt driven, L. P. cyl. 17 in., H. P. cyl. 10½ in. x 14 in. stroke, 240 R.P.M. with 3-step control, idler and belt, 110 lbs. pressure, with or without motor, 440 volt, 60 cy. 3 ph.

10—Ingersoll-Rand, 6 type 20 portable, 309 cu.ft. cap., 3 type 20 portable, 210 cu.ft. cap., 1 portable, 230 cu.ft. cap.; all gasoline driven.

CONCRETE PLANTS

3—Batch Mixing Plants complete with bins, inundators, stone batchers and weighing devices.

5—Smith, 2-yd. Concrete Mixers, with 40 hp. Electric Motors.

Large number Ransome and Insley Concrete Tower Buckets, Hoppers, Counterweight Chutes, Trussed Chutes, Plain Chutes, Floor Hoppers, etc.

CONVEYORS (Belt)

8—Belt Conveyors; belts 20 to 42 in., 120 to 500 ft. lengths.

DERRICKS

10—Steel Stiff Leg Derricks, 1 65-ton, with 100-ft. boom; 1 20-ton with 100-ft. boom; 5 10-ton, with 80-ft. booms.

3—Steel Guy Derricks, 2 10-ton, 100-ft. mast, 90-ft. boom; 1 10-ton, 115-ft. mast, 100-ft. boom.

HOISTS

4—Steam Hoists, double cylinder, 3-drum with boilers; 1, 9½x12, and 3, 8x12. Also 8 separate swingers, steam.

6—Electric Hoists; 2 135-hp. double drum, 1 100-hp. double drum with attached swinger, 3 60-hp single drum, all American H. & D. Co. with 440 volt, 60 cy., 3 ph. motors.

PUMPS

28—Centrifugal Pumps direct connected to alterating current electric motors, ranging from 12 in. suction, 12 in. discharge down to 3 in. suction, 3 in. discharge.

SHOVELS

6—Steam Shovels; 2 Marion, type 37 on crawlers, 1¾ cu.yd. dipper full revolving; 3 Marion, model 21 on crawlers, 1 cu.yd. dipper; Shop Nos. 5433, 5445, 5521; 1 std. ga. Marion, model 60, 2½ cu.yd. dipper. Shop No. 2225.

1—Gasoline Electric Marion, type 7, crawler shovel with electric trip. Shop No. 5802.

ALSO LARGE STOCK OF BOILERS, BUCKETS, CARS, CRANES, DRILLS, LOADERS, LOCOMOTIVES, STEAM HAMMERS, STEAM SHOVELS, STEEL TOWERS, SAW RIGS, etc.

EQUIPMENT CORPORATION OF AMERICA

Pittsburgh, Pa.	Chicago, Ill.	Philadelphia, Pa.	Conowingo, Md.
856 Empire Bldg.,	1156 S. Washtenaw Ave.	656 Horn Bldg., 1601 Chestnut St.	Box 86
Phone: Grant 5148	Phone: Seeley 5100	Phone: Rittenhouse 5498	

Equipment For Sale

at Fort Pierce, Florida

Used on one job.

1—7s Leach Gas Mixer No. 185.
1—H-P Gas Grader.
1—2000 yard Portable Warren Asphalt Plant.
1—8 ton Tandem Buffalo Springfield Roller No. 13338.
Small Tools and Repair Parts.

Address: SIEMS, HELMERS & SCHAFFNER, INC.
1014 Guardian Building, St. Paul, Minn.

Steel Spring Cots For Sale

342 available. Size 2 ft. 6 in. x 6 ft. Steel folding legs.

Price $1.00 each in lots under 50—75c each in lots of 100 to 200—50c each for entire lot.

All F.O.B. Trenton, Mich.

THE DETROIT EDISON CO.
2,000 Second Ave., Detroit

Buyers Everywhere know "Searchlight"

Try an ad for what you wish to sell.

Somewhere—

there's a buyer for the Equipment you no longer need. Reach him thru an advertisement in the SEARCHLIGHT SECTION.

Rebuilt and Guaranteed

Partial List Pumps and Compressors

Air Compressors—Belted

24x16 in. Bury.
12x12 in. Laidlaw-Dunn-Gordon.
10x10 in. Ingersoll-Rand.
9x9 in. Curtiss Duplex.
6x6 in. Chicago, Model G.S.B.

Air Compressors—Steam

7x8x8 in. Marsh.
4x3x6 in. American.
4x3x5 in. Union.

Centrifugal Pumps

2—10 in. Allis-Chalmers.
1—10 in. Special.

Steam Pumps

9x7x12 in. Worthington Duplex.
7½x4 in. Laidlaw-Dunn-Gordon-Duplex.
4½x8 in. Deming Triplex.
8x5x8 in. American.
7½x7x7½ in. National.

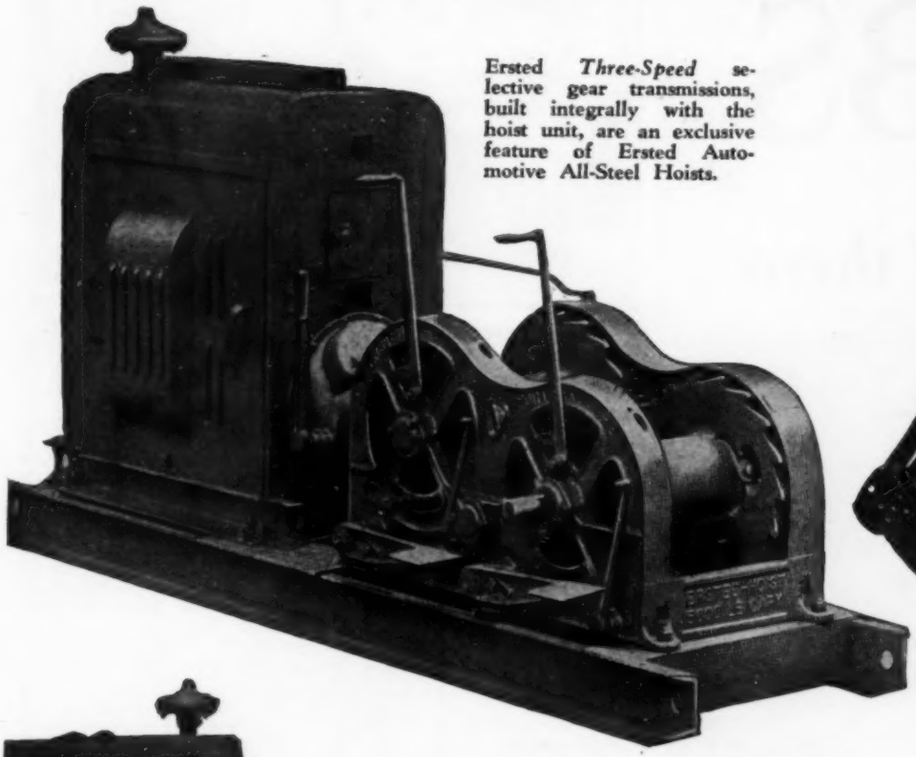
Also All Kinds of Metal Working Machine Tools, Approximately 3,000 to Choose From

Riverside Machinery Depot

The Used Machinery House

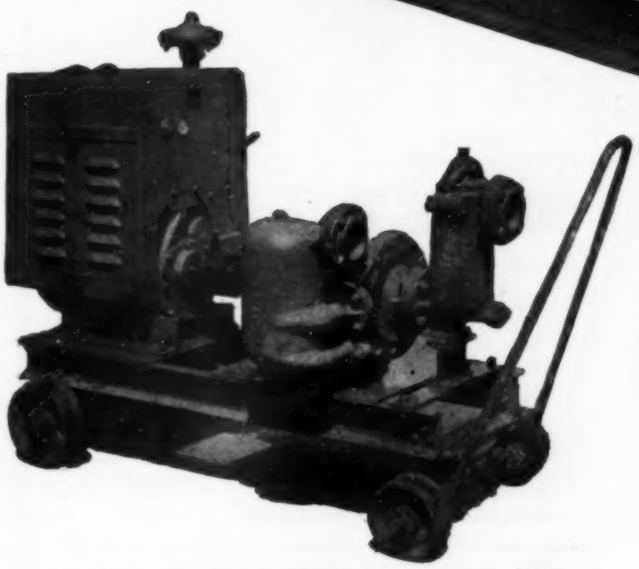
251 St. Aubin Ave., Detroit, Mich.

FOR SALE OR RENT



Ersted *Three-Speed* selective gear transmissions, built integrally with the hoist unit, are an exclusive feature of Ersted Automotive All-Steel Hoists.

"Brownhoist" Buckets. Types and sizes to fit every handling need. Rugged, Powerful. You know what the name means.



La Bour Centrifugal *Self-Priming* Pumps. Moderate Speed, Large Clearance, No Valves, Permanent or Portable. Gasoline or Electric.

"Headquarters" for Good Equipment

Not the least part of our business is co-operation with contractors—"service" that means supplying the equipment and seeing that it gives satisfaction.

Get in touch with us first and save time and money.

MOTT & McELRATH ENGINEERING CORP.

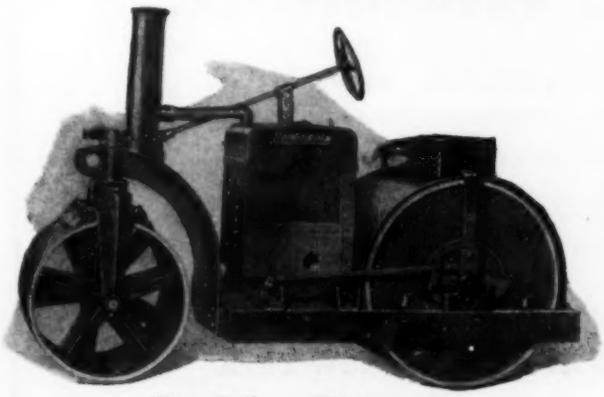
249 WEST 18th STREET, NEW YORK CITY

Phone Watkins 8588-8589-8590

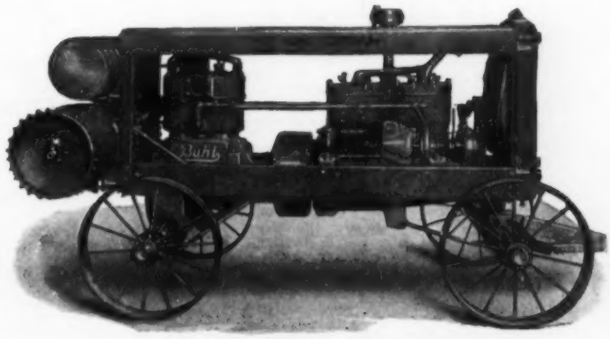
Branch Office:

MACHINERY EXHIBITS & SALES DEPARTMENT

Bourse Building, Philadelphia, Pa.



Pierce Rollers. Weight can be varied from 1½ to 2 tons.



Buhl Air Compressors. Sizes to suit all requirements.

JOBS

and

men to fill them

POSITIONS VACANT

DESIGNERS and draftsmen, experienced in designing and detailing steel and reinforced concrete highway bridges. Apply for application form to J. S. Watkins, State Highway Engineers, Frankfort, Ky.

DETAILER, experienced, only steady employment with opportunity, structural engineer's office, New York City. Give qualifications. P-72, Construction Methods, Tenth Ave. at 36th St., New York.

DRAFTSMAN wanted, familiar with the detailing of structural steel work and miscellaneous iron work for buildings. Apply in writing to James McKinney and Son, 927 Broadway, Albany, N. Y. advising salary desires and previous experience.

ERECTOR, young man with engineering education wanted to travel and erect industrial equipment for Philadelphia suburban manufacturer. Good opportunity for right man. Not a white collar job. P-73, Construction Methods, Tenth Ave. at 36th St., New York.

EXPERIENCED men on structural details. Permanent positions for first-class men. Location Philadelphia. Apply by letter giving age and experience in detail and salary expected. P-74, Construction Methods, 1600 Arch St., Philadelphia, Pa.

EXPERIENCED structural steel draftsman. Reply by letter giving age, experience, salary expected, to Disher Steel Construction Company, Limited, Toronto, Canada.

EXPERIENCED template maker for bridge work wanted. State wages. Give references. P-75, Construction Methods, 7 So. Dearborn St., Chicago, Ill.

FIRST-CLASS allround structural steel detailers. Permanent positions. McClintic-Marshall Company, 39 Broadway, New York City.

STRUCTURAL steel designers and detailers wanted at once. Applicants must state age, nationality, education, experience in full, salary expected and earliest date possible to report. Good opportunity for the right men. Only written applications giving full information considered. Address R. D. Snodgrass, Consulting Engineer, Truscon Steel Co., Youngstown, Ohio.

SURVEYOR and computor, experienced in farm, lot and subdivision surveys; capable of making required calculations and maps; state age, experience, married or single, and submit sample of drafting and references. P-76, Construction Methods, Tenth Ave. at 36th St., New York.

WANTED, steel erection superintendent for supervising erection for large Midwest structural steel fabricating plant. State experience, age, past and present employment, terms and education. P-77, Construction Methods, 7 So. Dearborn St., Chicago, Ill.

SEARCHLIGHT SECTION

Construction Methods

Tenth Avenue at 36th St., New York

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Positions Wanted, 6 cents a word, minimum $1.25 an insertion, payable in advance.

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Proposals, 50 cents a line an insertion.

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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

POSITIONS WANTED

Superintendents

CONSTRUCTION manager or general superintendent wants position with responsible building firm. PW-71, Construction Methods. 7 So. Dearborn St., Chicago, Ill.

MAIN line railroad supervisor, age 41, college graduate, 18 years with same company in construction and maintenance of tracks and structures, now in charge of 450 men, desires permanent position with reliable contractor. PW-66, Construction Methods, Tenth Ave. at 36th St., New York.

Designer and Detailer

STRUCTURAL engineer, college graduate, 27, 5 years' experience, desires position. One year detailing and designing reinforced concrete. Three years detailing, designing and estimating structural steel. One year supervising steel erection. Good correspondent, excellent references. Location preferred, Philadelphia. PW-70, Construction Methods, Tenth Ave. at 36th Street, New York.

STEEL SHEET PILING

LINDHEIMER — Successful Performance Guaranteed — Service

Saves you money and trouble in Foundation, Cofferdam, and Sewer work.

Bought-Sold-Rented—Always carried in stock

LONG DISTANCE TELEPHONE: CENTRAL 0491

S·W·LINDHEIMER

31 South Clark St. CHICAGO

Why buy wood sheeting?

You can save money by renting Steel Sheet-Piling from Wemlinger, Inc.—and do a more satisfactory job.

We maintain stocks of Steel Sheet-Piling throughout the country, for sale or for rent.

Wemlinger, Inc.
149 Broadway, New York

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More Light for Less Money

Do you Investigate the Operating Costs of your Emergency Lighting? Some lights cost 6c. to 11c. an hour for 8000 Candlepower. The Milburn Furnishes 8000 Candlepower for only 3-1/3c. an hour.

Milburn Portable Carbide Lights are used by leading contractors who overlook no opportunity to make every saving that can be effected without sacrifice of efficiency.

Patented features, found only in Milburn Lights are responsible for these economies. Here are a few of these points:

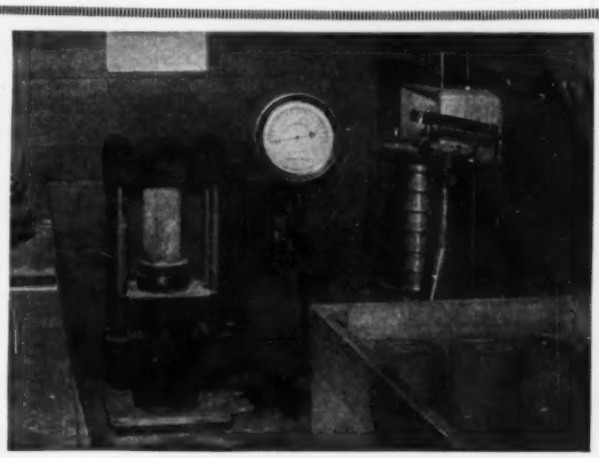
1. **THEY FURNISH 8,000 C.P. FOR ONLY 3 1/3c. AN HOUR.**
2. **They burn either commercial or cake carbide.**
3. **Light can be turned off for any period and relit WITHOUT LOSS OF CARBIDE.**
4. **They work absolutely automatically.**
5. **They do not require a change of water when recharging the light.**
6. **They are practically self-cleaning.**
7. **They cannot be overcharged.**
8. **They combine all the good points of other lights with numerous exclusive patented features found in no other lights.**

Let Milburn Carbide Lights save money for you too. Get full details.

Ask for Booklet No. 2499

THE ALEXANDER MILBURN COMPANY
1416-1428 W. Baltimore St. Baltimore, Md.

If interested in spray painting equipment or cutting and welding, ask for information on these subjects also



You Can Prevent Concrete Failures

Frequent compression tests are not only now required on all large contracts, but are absolutely essential from a standpoint of safety.

The illustration shows one of our 100-ton hydraulic presses arranged especially to test concrete test cubes, cement, stone, etc.

When it is desired to check and calibrate the gauge load readings, a variable pressure accumulator (of known increments) is furnished.

Write for Bulletin B-18X

THE WATSON-STILLMAN CO.
1014 Evening Post Bldg., New York City

Chicago, 549 W. Washington Blvd. Philadelphia, Widener Bldg.
Cleveland, Auditorium Garage Bldg. Detroit, 7752 Dubois St.

No. 259

A washable work glove—think of it!

No. 259 Made of Buffed Elk. Outseams and all seams on back of hand protected.

Sabin Exclusive hold tight back—six inch canvas cuff—comfortable—easy to wear—easy to wash.

Price—$1.60 per pair. Send check, draft or money order.

Sabin Co.,—*Gloves*
536-40 W. Federal St., Youngstown, O.

Sabin Co.,—*Gloves*
536-40 W. Federal St.,
Youngstown, Ohio

Send me information on Sabin Gloves

Name .....

Address .....

.....

.....

If you wish a pair of No. 259 Gloves enclose $1.60 and check here ☐

Style No. 2

This popular model weighs only 115 pounds fully charged. Anyone can charge it in a few minutes. It furnishes plenty of light for 25 to 30 men to operate under. One full charge burns for twelve hours.

CARBIC LIGHT
makes night work safer *and more productive*

NIGHT construction work by fire-light or with dim lantern light is slow and often dangerous. Too many accidents occur in broad daylight. Naturally more happen at night because of insufficient light!

That is why thousands of Carbic Flood Lights are being used for night construction work. Contractors have found that accidents are reduced to a minimum and in addition work is more productive.

The Carbic Light is simple and portable. It is always ready when emergency night work arises. It supplies a steady diffused light, bright but not glaring. 14 years of use have proved its long life and low cost of operation.

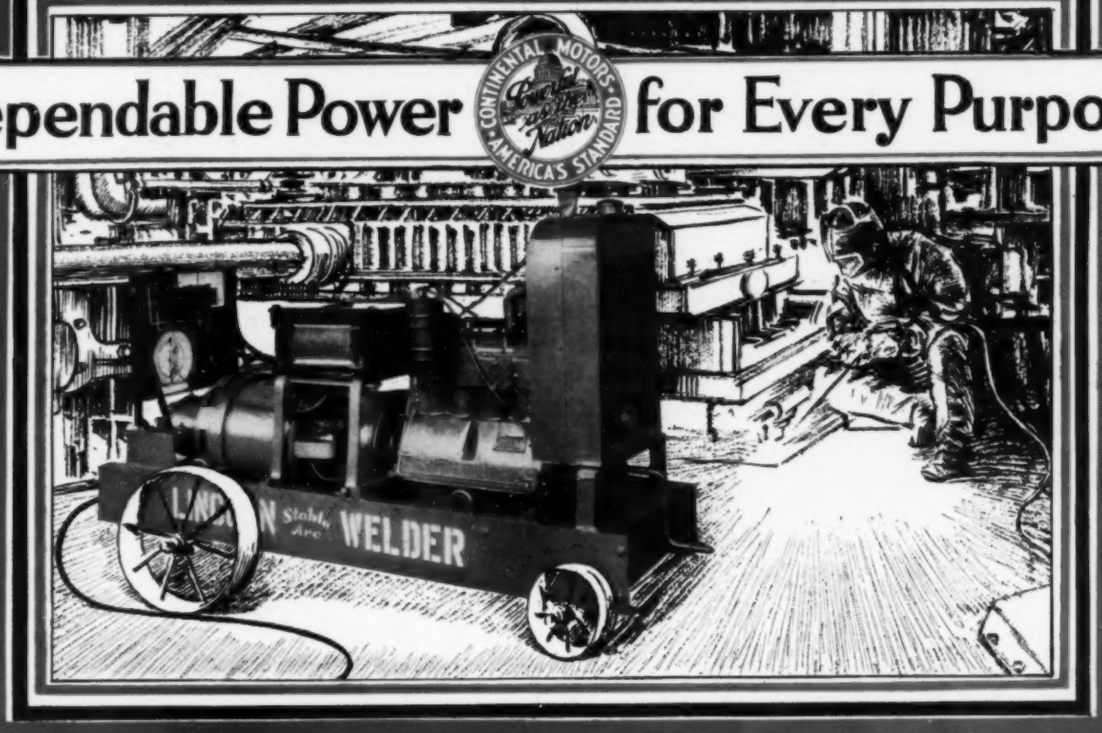
Your jobber can supply you.

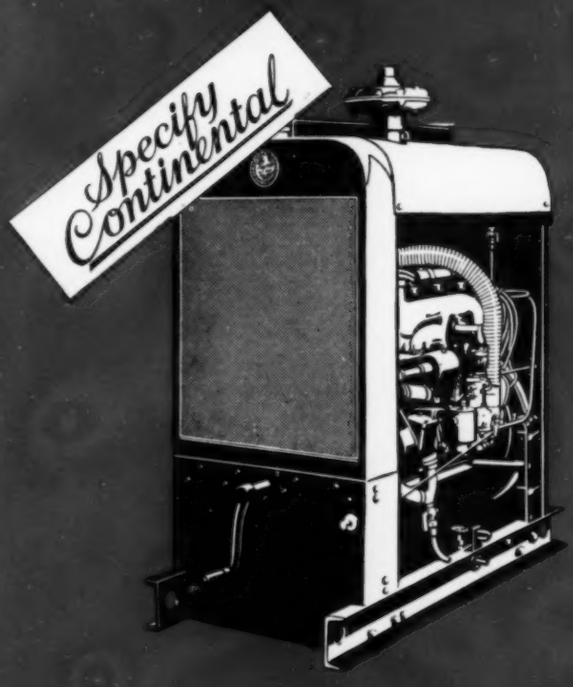
CARBIC LIGHT

OXWELD ACETYLENE COMPANY
Unit of Union Carbide and Carbon Corporation
New York City, 30 East 42d Street — UCC — Chicago, Peoples Gas Bldg.
San Francisco, Adam Grant Building

Carbic is distributed by the Union Carbide Sales Company through its national chain of warehouses and is sold by jobbers everywhere.

Dependable Power for Every Purpose





Abundant Power *for* Light Units

The self contained light weight, readily portable arc welder with its own motive power now occupies a place of increasing importance. It is particularly valuable in arc welding for structural work and pipe line construction. The welder shown above is powered with a type H-9 four cylinder Red Seal Continental engine giving abundant power to this light but sturdy unit.

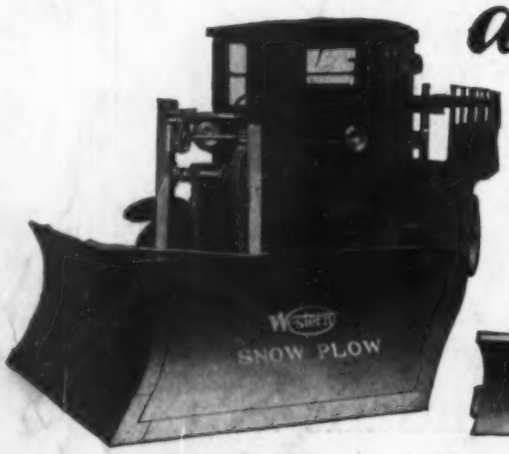
CONTINENTAL MOTORS CORPORATION
INDUSTRIAL EQUIPMENT DIVISION
Office and Factory: Muskegon, Michigan
The Largest Exclusive Motor Manufacturer in the World

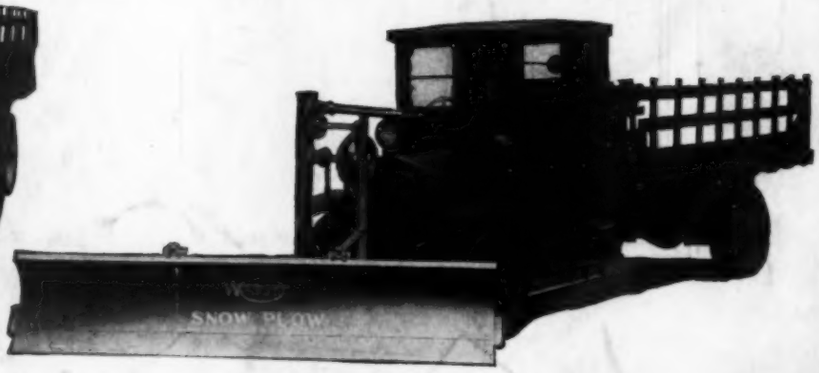
Continental Motors

THE AUSTIN · WESTERN LINE

When winter comes

and lays his hand on city street and country road





COMMUNITIES that use Western Convertible Snow Plows are not troubled by the winter road problem. Many miles can be cleared of snow as fast as it falls by attaching these plows to the fronts of motor trucks. The straight blade is the one most generally used, but for deep drifts, the "V" shaped blade is needed.

Western Snow Plows are inexpensive enough to be within the financial reach of the smallest communities, both because of their cost and the complete range of service afforded by their convertibility feature—both blades fitting the same frame, and one type of blade easily being substituted for the other by simply removing and replacing a few bolts.

Motor Graders also make excellent snow removers when supplied with special snow blades. The Austin "V" shaped snow plow attachment is used to break a path for the front wheels. Write for descriptions and prices of snow removing equipment.

See us at the Cleveland Road Show, January 14th-18th, 1929

THE AUSTIN-WESTERN ROAD MACHINERY CO.
400 N. Michigan Ave., Chicago, Ill., U. S. A.
Branches in principal cities

Austin-Western
ROAD MACHINERY

"MOST MILES FOR YOUR ROAD DOLLARS"